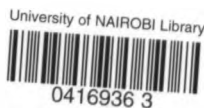


**ASSESSING TRADE-OFFS BETWEEN PASTORAL ECONOMY AND WILDLIFE
CONSERVATION IN THE EWASO NYIRO BASIN, NORTHERN KENYA:
A Case Study of Naibung'a and Namunyak Community Conservancies.**

A Thesis Submitted In Partial Fulfillment Of Requirements Of Master's Degree Of University
Of Nairobi (Veterinary Public Health).



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2010

Declaration

This thesis is my original work and has not been presented for a degree in any other University.

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Dedication

To my wife Pascalyne and my son, Simari.

My beloved mother Rehero, although unable to read or write, she gave me a priceless
education,

and

To my late father Lenasha Olesarioyo.

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List of Abbreviations and Acronyms

AIDA-	Agricultural Innovation for Dry lands Africa
ACC –	African Conservation Centre
ALRMP-	Arid Land Resource Management Project
ASAL –	Arid and Semi-Arid Land
AU-IBAR –	African Union Inter-Africa Bureau of Animal Resources
AWF-	African Wildlife Foundation
DLWEIP-	Dry land Livestock Wildlife Environment Interface Project
EMCA –	Environmental Management and Coordination Act
ENNDA –	Ewaso Nyiro North Development Authority
CAMPFIRE-	Communal Areas Management Plan for Indigenous Resources
CBC-	Community-based conservation
CBRNM-	Community-Based Natural Resource Management
CIRAD-	French Agricultural Research Centre for International Development
CPA-	Community Participatory Appraisal
CTA-	Technical Centre for Agricultural Cooperation
CRI-	Community Research Initiatives
CBET-	Community Based Ecotourism
ET-	Ecotourism
FARA-	Forum for Agricultural Research in Africa
FG-	Focus Group
GDP-	Gross Domestic Product
GoK –	Government of Kenya
ILRI-	International Livestock Research Institute
IK-	Indigenous Knowledge
IIED-	International Institute for Environmental Education
ITDG-	Intermediate Technology Development Group
IIRR-	International Institute of Rural Reconstruction
IUCN –	International Union For Conservation of Nature
KTK-	Kijabe, Tiemamut and Koiya
KWS-	Kenya Wildlife Service
LWF-	Laikipia Wildlife Forum

MLRDP-	Maasai Livestock and Range Development Project
NDVI-	Normalized Difference Vegetation Index
NGO-	Non-Governmental Organizations
NRM-	Natural Resource Management
NRT –	Northern Rangelands Trust
PAs-	Protected Areas
PRA-	Participatory Rural Appraisal
SSIs-	Semi-Structured Interviews
RUFORUM-	Regional Universities Forum for Capacity Building in Agriculture
VBZD-	Vector-Borne and Zoonotic Diseases

Abstract

Naibung'a and Namunyak community conservancies as case studies have resulted from the efforts of the Samburu and Maasai communities aimed at incorporating wildlife as a land use into their communally owned livestock ranches in the Ewaso Nyiro Ecosystem. The idea is to balance the use of pastureland for livestock production in co-existence with high diversity and biomass of wildlife, thus allowing for development of eco-tourism enterprises that contributes towards livelihoods.

This study was therefore designed to assess trade-offs between pastoral economy and wildlife conservation in community owned conservancies in Ewaso Nyiro Ecosystem.

The study was carried out in Naibung'a Conservancy, Mukogodo Division, Laikipia District and Namunyak wildlife conservancy in Wamba Division, Samburu East District. The specific objectives were: (1) Determine the socio-economic and cultural factors that promote sustainable integration of livestock keeping and wildlife conservation. (2) Characterizes knowledge, attitudes and practices of Maasai and Samburu communities in relation to wildlife conservation and diseases of public health significance (3) Determine benefits and constraints of community conservation initiatives.

A variety of tools and methods used were based on the principles of participatory rural appraisal (PRA). Semi-structured questionnaires were administered to 108 randomly selected households during the transect walk. Maps and photos of the conservancies were taken focusing especially the contrast between the conserved areas and the grazing land. Two focused group discussion (n=10) were held with NRM committees. Twenty Semi-structured interviews (SSIs) was applied obtain information on benefits and constraints of community based conservation. Key informant interviews (n=20) were conducted with area local chiefs and Natural Resource Managers from Naibung'a and Namunyak Conservancies.

Community participatory approaches to wildlife conservation have significant influence on the successful natural resource management of Naibung'a and Namunyak community conservancies ($F= 10.751$, $d.f= 32, 77$, $p= < 0.000$). There is also high positive correlation between these variables and community conservation success ($r^2= 0.817$, $n=108$ households). Similarly, conservation friendly culture and ecotourism have significant influence on change of attitudes towards game meat and general acceptance of wildlife as alternative source of income ($F= 9.831$, $d.f= 32, 77$, $p< 0.000$).

The study findings shows that strong and equitable community institutions, secure resource rights, active community participation and benefit sharing partnerships are key governance attributes for successful and sustainable community-based conservation in Naibung'a and Namunyak. Pastoralists have ethnoveterinary knowledge that could be integrated with the modern medicine. They have used this ethnoveterinary knowledge to manage zoonotic diseases at the livestock-wildlife interface.

Using pairwise matrix chart and disease incidence scoring, the most prevalent zoonotic diseases in Naibung'a are Brucellosis (28.6%) and Tuberculosis (33.3%). Other recorded disease cases are Rabies (6.0%), Anthrax (21.0%), and Typhoid (6.1%). The mean average numbers of people affected by these zoonotic diseases are 22.38 and 47.26 ($n=40$) for adults and children respectively. Some of the benefits of having wildlife conservation alongside livestock production include; employment creation, conservation of threatened medicinal plant and species, economic gain through ecotourism, enhance pasture management through zonation, and there is increased security for wildlife and people.

The constraints faced by these community conservation initiatives include:

- Weak or unclear community rights to land, water, other natural resources and the benefits from their management.
- Imperfect processes for developing policies for community-based conservation or devolved resource control.
- Failure of policies to address the underlying causes of resource degradation, e.g. trade terms, debt and debt servicing, lack of valuation of natural resources.
- Lack of community capacity for transforming natural capital/adding value

The study recommends that:

- There is need to build capacity among members of the conservancy on sustainable use and management of their natural resources.
- Establish a clearly defined zoning plan, strengthen and expand the wildlife management programmes in the conservancy.
- The need for change of centralized support with greater flexibility and opportunities for innovation with emphasis on the resource managers

Further research is also needed to evaluate the costs and benefits of conservation to communities, and the extent to which local conservation efforts benefit wider society (e.g. quantity of water provided), to strengthen arguments for community payments for environmental services.

Chapter One:

1.1. Introduction

1.1.1. Background Of The Study

In East Africa, an estimated 70 percent of wildlife populations are dispersed outside protected areas (PAs) on land, which overlaps with pastoralism (Western and Gichohi, 1993). The way of life of the pastoralists supports, to a larger extent the thriving of wildlife. Community-oriented approaches to wildlife conservation usually have a strong economic rationale typically based on the premise that if local people participate in wildlife management and economically benefit from this participation, then a “win win” situation will arise whereby wildlife is conserved at the same time as community welfare improves (Emerton, 1998).

The main concern therefore is not the total economic value of wildlife but rather the extent to which wildlife benefits actually reach the local residents of wildlife areas. Since land and resource ownership determines use, beneficiaries, rights and responsibilities for that land and its resources, tenure is a critical factor for conservation. Tenure determines the linkages between responsibility and authority over land and natural resources, and determines the incentive structures for sustainable use (Murphree, 1993).

The Ewaso Nyiro Basin is an area spanning over 30,000 km² with variable topography ranging from 200 to over 3000 m (Fig 1.1). Much of this landscape is semi-arid and two major physical features influence the climatic and drainage patterns within this landscape; the Aberdare ranges system to the southwest that forms the source of Ewaso Nyiro River and Mt. Kenya to the east that provides many tributaries. The Mathews Range to the north, though imposing, has a largely seasonal contribution. We may describe the climate here as tropical wet and dry. Temperatures are warm and stable throughout the year averaging a daily maximum of 32 °C, with high daytime temperatures. Solar radiation is intense and much of

the surface water lost in evapotranspiration, while intensity of tropical storms ensures that much of rainwater runs off in floods. Relative humidity is typically low, and mean annual potential evapotranspiration exceeds 2000 mm (Pratt and Gwynne, 1977). Seasonal changes in wind patterns result in distinct wet and dry seasons. There is a wide range in the total seasonal rainfall, but the minimum is at least 51 mm per year (Norton-Griffiths, 1995).

1.2. Naibung'a Community Conservancy

Naibung'a Conservation Trust was established in 2001 through the collective effort of nine Maasai group ranches in the western region of the Mukogodo Division in Laikipia District (Fig 1.1). The group ranches worked together to combine their lands and resources into one large community conservancy. Community members realized the need for conservation efforts in the area as increasing numbers of people and livestock coupled with persistent droughts were severely damaging the surrounding environment.

The conservancy works as a catalyst for wildlife conservation, environmental rehabilitation, conflict resolution and sustainable business development for members of the nine group ranches. Its mission is to conserve the integrity of the natural and cultural resources of the Laikipia Maasai area, while promoting the sustainable use of these resources in eco-tourism development to provide economic benefits to conservancy members. The conservancy is home to populations of elephant, lion, cheetah, hyena, impala, Grant's leopard, rabbit, tortoise, plain and Grevy's zebra, Tommy and Grants gazelle, amongst other wildlife species.

1.3. Namunyak Community Conservancy

Namunyak Wildlife Conservancy is located in the Ngilai West location of Wamba Division of Samburu District in the Rift Valley Province of Kenya. The conservancy covers an area of

100,000 acres and encompasses the Uarges, peak of the Mathews' range, and Ololokwe the southernmost hill of the range (Fig 1.1). The mission of Namunyak is to promote wildlife conservation and the socio-economic development of the Samburu community through sustainable utilization of natural resources. Namunyak serves as a critical wildlife refuge for many species and holds abundant populations of giraffe, gerenuk, leopard, African wild dog, impala lion, Greater Kudu, elephant and many bird species. It is also home to the rare De Brazza colobus monkey, the rare IUCN red-listed cycad, *Encephalartos tegulaneus* endemic only to Kitich, spectacular hartlaub Kitich forests are a treasure trove of rare and often uncatalogued species. The area is particularly important for elephant as they move seasonally between the Mathews Range and the Mt. Kenya and Ngare Ndare Forests.

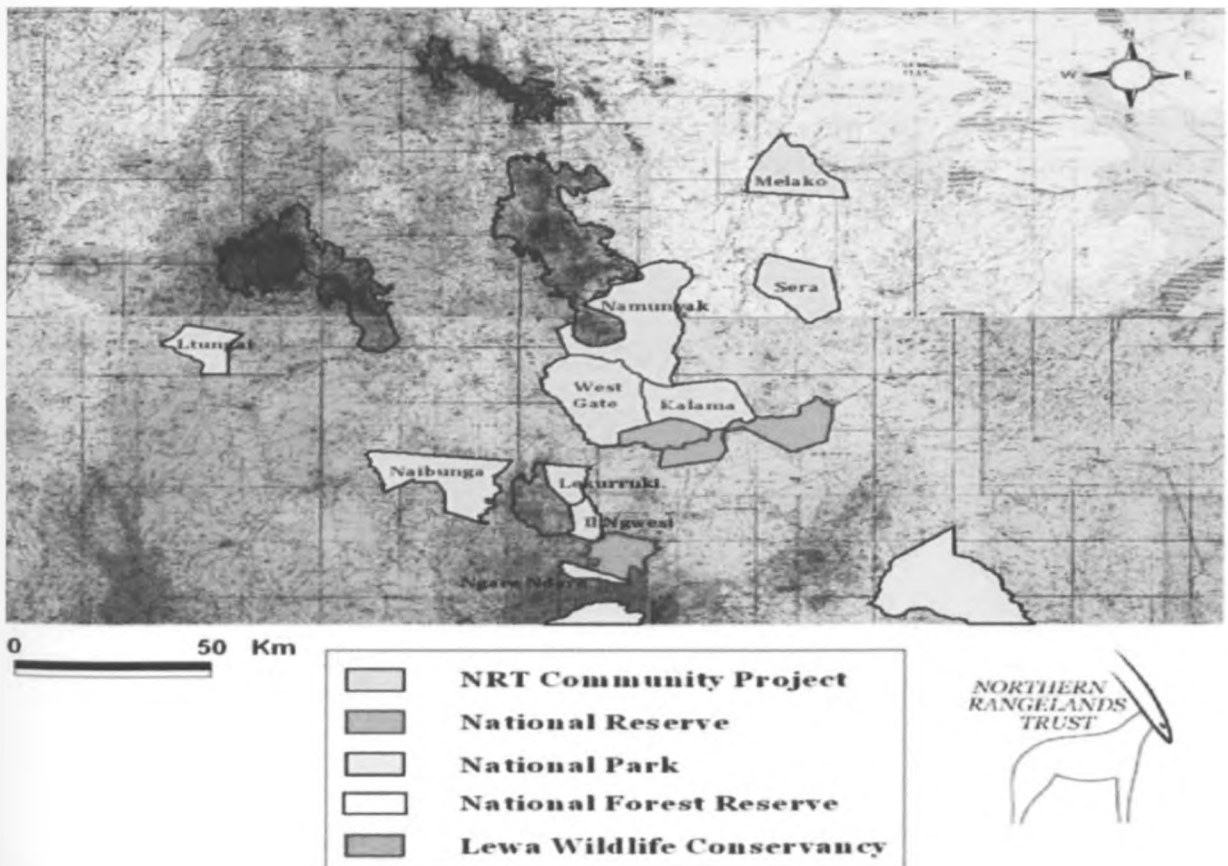


Figure 1.1: Location of Naibung'a and Namunyak Wildlife Conservancies relative to other conservation areas in the Ewaso Nyiro ecosystem (Courtesy NRT).

2.0. Overall Objectives

To assess trade-offs between pastoral economy and wildlife conservation on the community owned group ranches in Naibung'a and Namunyak.

2.1. Specific Objectives

The specific objectives are:

- i. To characterize the knowledge, attitudes and practices of communities in Naibung'a and Namunyak conservancies in relation to wildlife conservation and diseases of public health importance.
- ii. To investigate the socio-economic factors that determine the community acceptance of wildlife in their community owned group ranches in Naibung'a and Namunyak wildlife dispersal areas.
- iii. To determine the benefits and constraints of community based conservation in Naibung'a and Namunyak conservancies.

3.0. Chapter Two: Literature Review

3.1. Introduction

The underlying methodological direction of the study is discussed drawing upon the relevant literature in relation to the methodology and the research milieu. Part one initially examines the thematic basis upon which this research is anchored— Evolution of Community Based Conservation. The general picture regarding the status quo as far as pastoralism and wildlife conservation in Ewaso Nyiro ecosystem is also discussed. The last chapter deals with diseases of public health importance at the Livestock-wildlife interface. Finally, the researcher has identified gaps that might be found within these studies that might give justifications for further research.

3.2. Arid and Semi-Arid Lands (ASAL) and Wildlife Presence

The definition of the Arid and Semi-Arid Lands (ASAL) may vary slightly but it is generally accepted as that land with a ratio of rainfall to open pan evaporation of less than 50%, (Southgate and Hulme, 1996). Under this definition, 22 districts lie at least partially within ASAL. (Table 3.1).

Table 3.1: Kenya's districts in Arid and Semi-Arid Lands (ASAL)

% of district in ASAL category	Districts	% of total ASAL area in Kenya
100	Isiolo, Marsabit, Garissa, Wajir, Turkana, Mandera	62
85-100	Kitui, Tana-River, Taita Taveta, Kajiado, Samburu	25
50-85	Embu, Meru, Laikipia, Machakos, West Pokot, Kilifi, Kwale, Baringo	10
< 50	Lamu, Narok, Elgeyo Marakwet	3

Source: (Chris Southgate and David Hulme 1996), p.2

The ASAL areas are also home to Kenya's wildlife populations. Most of the wildlife co-exists with the livestock that is mainly kept by pastoralist communities. The way of life of

the pastoralists supports, to a larger extent the thriving of wildlife. They move from place to place with their livestock in search of water and pastures. However, recent trends in population growth have continuously exerted pressure on the existing rangelands. The resultant effect has been increased human-wildlife conflicts.

The conflicts arising from wildlife-human interactions are aggravated by the fact that Kenya's land tenure policies are not clear-cut. The rights of both wildlife and people even on private land are not adequately represented. On private land, which is solely managed by the investor, wildlife is still owned by the government (Juma and Ojwang, 1996).

3.3. The Evolution Of Community Based Conservation

Community-based conservation (CBC) has become what many claim is a new conservation unfolding across Africa (Hulme and Murphree 2001). It seeks to stretch conservation efforts *out* beyond PAs, and bring communities *into* conservation initiatives through benefit sharing and participatory planning (Ghimire and Pimbert 1997, Hackel 1999, Hulme and Murphree 2001). Ecological benefits are projected because of the extension of areas conserved and individual behavioural changes which foster wildlife conservation.

CBC is an evolving set of economic, social, and institutional tools which seek to limit activities detrimental to wildlife, while providing economic returns to communities that balance the costs of living with wildlife (Adams and Hulme 2001, Hackel 1999, Hulme and Murphree 2001, Western et al., 1994). CBC can be characterized as rural, participatory, and utilitarian compared with the top-down and protectionist approaches of fortress conservation (Western 2001). It is important to recognize that within the all-encompassing discourse of CBC exists a wide diversity of different kinds of projects ranging from education and outreach, to collaborative management and community-based natural resource management.

Many CBC schemes seek to provide economic returns to communities in order to influence land use behaviours that are wildlife compatible (Adams and Hulme 2001, Hulme and Murphree, 2001). The key hypothesis is that economic incentives generated from wildlife utilization will engender increased local community support for conservation (Sikoyo et al., 2001b, Warner, 2000).

CBC initiatives attempt to find 'win-win' scenarios in which wildlife generates economic and social benefit flows while maintaining wildlife populations at desirable levels. Experiences with Zimbabwe's influential Communal Areas Management Plan for Indigenous Resources (CAMPFIRE) program (Alexander and MacGregor 2000, Bond 2001, Jones and Murphree 2004, Murombedzi, 1991, 1999, 2001) arguably provided a model for CBC in Africa and beyond. While key problems of CAMPFIRE included revenue distribution and race relations between rural villagers and white hunting operators, select villages were substantially and positively impacted by wildlife revenues (Murphree, 2001, 2005).

However, the trade-offs between conservation and development mean that only a small subset of development opportunities exist that really achieve environmental, economic, and social sustainability (Inamdar *et al.*, 1999). The economic effectiveness of CBC schemes which compensate rural people for trade-offs, such as the loss of access to resources in return for wildlife utilization revenues, is questioned in the literature (IIED 1994, Metcalfe 1995, Rutten 2002, Warner 2000). There is also little evidence to show that upgrading the conservation status of an area through CBC unequivocally results in an increase in wildlife populations (Caro 1999, Hackel 1999, Salafsky 1994). CBC evolved in response to:

- The increased conversion of wildlife habitat and a realization that people will likely continue to settle and cultivate as a primary response to population growth and the need for land in Africa (Cumming, 1993, Newmark, 1996, Norton-Griffiths, 1995).

- Political and economic awareness that conservation would be compromised without incorporating the support of people living adjacent to PAs and their livelihood needs (Ghimire and Pimbert, 1997, Hackel, 1999).
- A changing scientific paradigm in which island bio-geographic theory highlighted potential biodiversity loss in isolated parks, and a move away from the notion that ecosystems are not simple and closed systems, but rather interconnected through complex processes (Western, 2001).
- Protectionist approaches becoming unpopular due to the high costs of managing PAs versus their relative low economic returns to local people compared with alternative human-settled land uses coupled with the opportunity costs of PAs (Norton-Griffiths and Southey, 1995).

The narrative of CBC has become so widely adopted that it is now a defining and central thrust of global conservation policy (Adams and Hulme, 2001). However, if rural people accept CBC because of its economic benefits, they may reject it in future if a better economic alternative is presented. The priorities of rural Africans, and the economic choices they are forced to make, often lead to actions which are not compatible with wildlife conservation (Mortimer and Tiffen, 1995). Rural people manoeuvre within often narrow socio-economic constraints, and CBC programs risk restricting people's economic choices further (Berry, 1993, Hackel 1990, Zinyama, 1995). Development policies that restrict people's response to changing circumstances are characterized as forced 'primitivism' (Goodland, 1982). Western (2001) asserts that a fallacy of CBC is that wildlife will be conserved through purely free-market economics (Western, 2001). However, areas where CBC has the greatest opportunity for success are those rich in wildlife where

agricultural alternatives are problematic due to aridity or poor soils (Getz *et al.*, 1999, Gwashure *et al.*, 2001).

CBC is widely considered an obvious improvement over past 'fortress conservation' practices because of its inclusive philosophy. However, critiques of CBC centre on the level to which CBC really is participatory versus externally conceived (Adams and Hulme 2001, Hackel 1999, Igoe, 1999), and the challenge of articulating the precise role of biodiversity conservation in alleviating poverty (Adams *et al.*, 2004, Agrawal and Redford 2006, Roe and Elliott 2004, Sanderson and Redford 2003, 2004). The literature also examines the effectiveness of biodiversity conservation initiatives to alleviate poverty or to promote social development (Brockington *et al.*, 2006; Cernea and Schmidt-Soltau; 2006, McShane, 2003)

The government have introduced new participatory policies and laws to support community-based conservation which aim to devolve wildlife management and enhance benefits. Conservation partners have made policy changes that appear to create the enabling conditions for CBNRM implementation—by devolving rights over the use of wildlife to local communities and enabling communities to retain benefits from using wildlife through decentralised NRM models.

Despite these policy reforms, the practice of community-based conservation remains problematic where it is dependent on centralised bureaucratic organisations for planning and implementation (Pimbert, 2003a). It is rare for conservation professionals to relinquish the control over key decisions that is required for fully-fledged community-based conservation to succeed. Only active participation in joint analysis, planning and action will lead to sustainable conservation (Pimbert and Pretty, 1995; Pimbert, 2003a). Institutional cultures are difficult to change, particularly where control and vested interests are threatened (Carter and Gronow, 2005; Jeanrenaud, 2002).

In Zimbabwe, the intended devolution of authority to community level did not fully take place, but got stuck at intermediate levels of government such as district administrations (Mapedza and Bond, 2006). In Zambia, while CBNRM is well accepted, agencies often put their self-interest ahead of giving communities unambiguous rights and responsibilities, and seem deliberately to keep operational procedures unclear (Jones *et al.*, 2006).

3.3.1. Community Based Ecotourism (CBET)

Since 1945, tourism has grown rapidly to become one of the world's foremost economic phenomena (Deng *et al.*, 2002). Sustainable tourism has become important in the debate on environmentally integrated tourism development, as a result of the insight that the environmental consequences of this rapidly growing industry can no longer be ignored (Gossling *et al.*, 2002). Community based Ecotourism is a subset of community based tourism and it relates to an experience in remote or natural areas that fosters an understanding and appreciation of the need to conserve the natural environment in a way that sustains the resources, culture, the economy and the local community (Priskin, 2001).

3.3.2. CBET, Poverty Reduction and Economic Development

Development organizations see CBET as a potential source of economic development and poverty alleviation, particularly in marginal rural areas with limited agricultural potential. Overall, the experience to date is that most CBET projects produce (at best) modest cash benefits, and a relatively small proportion of the community often captures these. (Non-income benefits, although potentially very important, are even harder to quantify and evaluate.

However, even a small amount of additional income or resources for community projects can be welcome in cash poor rural areas. Ecotourism can generate support for

conservation among communities as long as they see some benefit (or maintain a hope of doing so), and if it does not threaten or interfere with their main sources of livelihood (Alexander, 2000), (Walpole and Goodwin, 2001), (Salafsky, *et al.*, 2001). Unfortunately, effective conservation often involves some sacrifice. For example, communities sometimes insist on allowing livestock into community wildlife reserves during times of drought, just when the wildlife also most need the water and forage (Watkins, 2002).

Tourism is also far from an ideal entry-level business for rural communities with little previous experience. It is competitive and demanding and can take years to get off the ground, and even people with considerable experience can fail to make a profit (Salafsky. *et al.*, 2001) They argued that simple enterprises that use skills and technologies that community members already possess are the most likely to be viable. This can apply to tourism support services, such as guiding or handicrafts, but not to the community-ownership model that CBET advocates tend to favor.

3.3.3. CBET as an Incentive For Conservation

For conservationists, the real question is whether CBET provides an effective incentive for communities to take conservation action. This incentive can take several forms. The ideal is a direct linkage, in which tourism earnings are so high that people deliberately protect biodiversity to protect that income. Tourism can also draw local labor and capital away from biodiversity unfriendly activities (Wunder, 2000).

However, for either of these to occur, tourism benefits must be sufficiently high and widespread to out-compete basic livelihoods. Aside from being uncommon, this kind of success is likely to attract outsiders, who will both dilute the benefits and put greater pressure on local natural resources (Wunder, 2000), (Hodgson *et al.*, 2000) and (Taylor *et al.*, 2002).

Another type of linkage is when an interested party helps a community group develop ecotourism, in exchange for their formal or informal agreement to support biodiversity conservation (Alexander, 2000). The expectation is that ecotourism will soon generate enough revenues to create a direct incentive for conservation, but projects often wind up front-loading and enhancing the benefits, funding community needs themselves rather than waiting for the income, to maintain community interest and cooperation. This effectively breaks the essential linkage, because the project itself becomes the conservation incentive, and communities can come to feel entitled to these benefits regardless of whether the tourism enterprise is succeeding or conservation objectives are being met.

3.4. Pastoralism and Wildlife Conservation

Pastoralism is a production strategy in which people raise herd animals as a means to earn a livelihood, often in ASALs. Pastoralism relies on the availability of water, pastures and labour to thrive with water as the determining factor. The inadequate rainfall limits crop-farming activities so that the people are left with pastoralism or nomadic pastoralism as the most feasible and consistent viable livelihood.

Pastoralism develops to get the most out of the opportunity provided by a surfeit of water and other resources in good seasons, and accepts losses in low seasons. They realize this by increasing livestock numbers in good seasons to maximize available resources and carry over enough healthy stock to provide for subsistence during the dry seasons.

Pastoralism is also a highly flexible system. According to (Umar, 1994), the practice has evolved over time as the most efficient means of exploiting transient water under ecologically marginal conditions, and prevailing technological and economic situations. The pastoral resource-use pattern is characterized by risk-spreading and flexible mechanisms, such

as mobility, communal land ownership, large and diverse herd sizes, and herd separation and splitting. The mixture of livestock is a system to manage risk. Small stock like goats and sheep, although more vulnerable to disease when compared with large stock, are cash buffers, for they have a high reproduction rate and they lactate during dry periods. Goats and camels can survive longer dry periods than cattle and sheep. The composition of livestock per family is determined by factors like personal preferences, ecological conditions, family size and available labour.

Pastoral production is mostly subsistence based and aimed at providing a regular supply of food in the form of milk, meat and blood for household members. Pastoralists also trade in livestock, hides and skins, and milk, for other food products or for cash income to purchase grains, pay for education, health care and other services. Production is usually organized within household units consisting of a male livestock-owner, his wife/wives, children and other dependants. Research has shown that the number of livestock kept is to satisfy the pastoralists' subsistence needs. A reference family of 6.5 persons would require nine lactating cows for sustenance. Taking into account the low calving rate, the need for male cattle and the necessary presence of young stock in a reproductive herd, an average pastoral family would therefore require a total herd of at least 60 animals. In the dry seasons when lactating cows are fewer and milk yields are lower, a family of five adult equivalents would need as many as 593 animals. Adding on to this minimum number for subsistence is male herds, young immature stock, and old stock for social ceremonial functions, and herds to cover any future normal crisis like drought (Lane, 1996).

Livestock are a means of subsistence and prestige goods that enable individuals to establish social relations with other members of society. At the same time, the animals enable individuals to establish and achieve mystic, but not irrational linkage with the supernatural.

The social but non-market transactions using animals enable pastoralists to attain food and social security, social reproduction and reduce risks (Umar, 1994). Livestock being a provider of basic needs, pastoralists have developed a special attachment that outsiders find hard to comprehend. Any community based conservation scheme in this region would have to contend with the problematic history of previous interactions between States and pastoralists.

The arrival of European power in East Africa reversed years of pastoral expansion. British colonial authorities 'interest in the land of central Kenya resulted in the alienation of important grazing grounds in 1904 and 1911 (Hughes 2006, Igoe and Brockington, 1999, Lindsay, 1987, Waller, 1976). Beyond the issue of competition for land, there were profound disagreements over what constituted good stock and land management.

The paradigm long held by many states is that pastoralism is a maladapted system of exploitation characterized by low productivity, overstocking, and rangeland degradation (Lamprey, 1983, Mackenzie, 1973). Colonial livestock policy focused on trying to make pastoralism more 'rational'. This meant converting Maasai pastoral economies, historically geared towards livestock subsistence, towards raising productivity of profit to the State (Talle 1999: 108). This focused on land privatisation, demarcation, and stock-rate control (Homewood, 1995). Pastoralists were historically excluded from protected areas based on the ecological argument that pastoralists were environmental stressors (Fratkin, 1997, Homewood and Rodgers, 1991, Prins, 1992, Sindiga, 1984). The theoretical explanation offered for some of these interventions was linked to Hardin's seminal—Tragedy of the Commons thesis (Hardin, 1968).

Drought and famine in the Sahel and East Africa in the 1970s and 1980s stimulated an increase in research into the future of pastoralism in arid and semi-arid rangelands (Ellis and Swift, 1988, Homewood and Rodgers, 1991). In the 1960s, the United States Agency for

International Development (USAID) funded the Maasai Livestock and Range Development Project (MLRDP). The aim of the project was to initiate ranching associations, which would be ecologically self-sufficient and owned by a group of Maasai families. The ranching associations were intended to maintain lower stocking rates to bring about ecological transition and economic integration into the national economy.

The project resulted in large-scale uncontrolled immigration of both pastoralists and agriculturalists, and ultimately causing conflicts. Scholars describe this phenomenon as the 'pastoralists dilemma' in which pastoralists see their land being treated as a free good and demand their privatized share of land before it disappears (Galaty, 1993b). The 'pastoralist's dilemma' occurs when community control is undermined by State or private interests (Fratkin, 1997). During this period, a number of internationally funded pastoral development projects were initiated that emphasized privatization of rangeland, commercial ranching, and pastoral sedenterisation (Fratkin, 1997). They have generally been motivated by Western perceptions of pastoral inefficiency and rangeland degradation control through the control of pastoral livestock numbers (Homewood and Rodgers, 1991).

An alternative paradigm developed which illustrated that pastoral ecosystems are non-equilibrial, with dynamics affected more by abiotic than biotic factors, and are a relatively efficient form of arid land utilization (Ellis and Swift, 1988, Mackenzie, 1973). Opportunistic pastoral management was seen as an efficient form of rangeland utilization (Behnke and Scoones, 1993, Ellis and Swift, 1988). Subsequent research explored an adaptation model termed 'new range ecology', emphasizing pastoralist land use rationality based on herd flexibility and mobility (Behnke and Scoones, 1993). Proponents of new range ecology encourage development approaches, which aim to strengthen traditional pastoral livestock management.

Some conservation agencies are caught between the long dominant and officially popular thinking of pastoralism as a problem and promoting traditional pastoralism as a land use strategy optimal for wildlife conservation. Development solutions in pastoral areas have ranged between total abandonment of pastoralism, to encouraging former herders to plant crops and cereals and raise livestock in sedentary settings. At the other extreme are opposing views, which advocate for restoring traditional pastoralism (Baxter, 1993, Steen, 1994). In general, however, the apparent compatibility of wildlife and livestock makes pastoral land use an attractive option to conservationist and international donors (Bourn and Blench 1999, Homewood and Rodgers, 1991).

African Wildlife Foundation and donor driven biodiversity conservation and poverty alleviation interventions in the Ewaso Nyiro ecosystem are premised on the hypothesis that if the returns to pastoralism can be enhanced along with wildlife revenues, then the incentives to engage in non-wildlife compatible agricultural conversion will be significantly reduced. The increasing privatization of pastoral rangelands seemingly contrasts with the participatory democratic empowerment processes encouraged by CBC for communities to make broad-scale decisions about land use and wildlife conservation. It is now land, not cattle, that is the most important resource in parts of Maasailand (Galaty, 1992).

Maasai politics and institutions are directly relevant to conservation policies that rely on community participation. However, the Maasai traditional social structure does not readily lend itself to community-based programs (Western 1994). The failure of imposed CBC institutional frameworks, particularly where district councils are responsible, has been outlined in well-known CBC schemes in Amboseli, Kenya and CAMPFIRE in Zimbabwe (Metcalf, 1994, Western, 1994). Will the utilization of free-market enterprise tools to achieve conservation goals actually shape Maasai livelihood diversification in ways

compatible with conservation? Is it fair for conservationists to assume that if provided with more economic options to diversify through wildlife and livestock herding, that the Maasai will support wildlife conservation in their land.

Naibung'a Conservancy: Livestock production is the most important activity in this conservancy as more than half of the land area is under ranching activities. Figure 3.1 shows the livestock trends between 1991 and 2005. The figure indicates that population of cattle and sheep declined in 1999 while that of goats and camels increased. Due to the rising demand for honey and the consequent incomes generated, the number of beehives rose dramatically. The decline in the production of most of the livestock can be attributed to various factors including drought, diseases, poor management, and shortage of water, and poor breeds among other factors. Cattle, sheep, and goats are traditional livestock kept by the Mukogodo Maasai.

Donkeys are also widely kept for transportation purposes. Keeping of camels is an emerging livestock holding strategy as a means to avert drought related challenges and production of milk. The distribution of livestock by location is provided in Figure 3.1. The price of goats and sheep ranges between Kshs 1000-2000, averaging Kshs 1,500, while that of cattle ranges between Kshs 4,000-9,000.

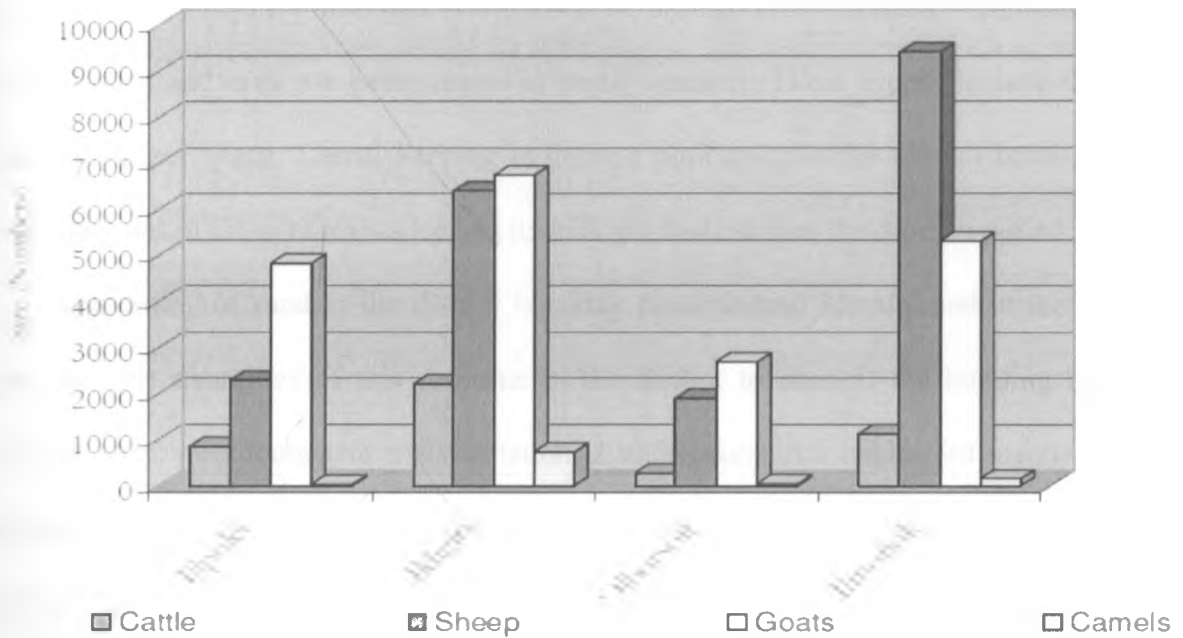


Figure 3.1: Livestock Production in Laikipia District, 2003 (Source: Oguge, 2005)

Namunyak Conservancy: Pastoralism is the main economic activity in Samburu district. It is estimated that livestock support about 80% of the district's population. Livestock production is practiced along the traditional extensive patterns except in government owned ranches where modern livestock production systems are practiced. Most of the pastoralist land is owned communally where the utilization is shared among all members of the community. Most of the cattle in the district are for meat production and comprises mainly the zebu type. Others include the Borans and Sahiwal.

Like all pastoralists, the Samburu sell their animals as a last resort even in times of drought. The culture encourages animals that have no sale value being taken to market, where they have to compete with animals from other areas of the country and Nairobi being the main outlet, the animals do not command good prices, hence the district continues wallowing in poverty. Goats and Sheep comprise mainly the small east African goats, red Maasai, black headed Persia, Somali sheep, a few Galla and dorper breeds of goats and sheep respectively.

Shoats are mostly kept for meat and skins, however, through cross breeding with other breeds, goats for meat and milk are being reared in small numbers. These breeds include the Galla goats and dorper sheep. Camel keeping is gaining popularity in the district because of its unique qualities of drought resistance and its milk production over the drought period.

Harvesting of sand in the district is taking place around Maralal and in the *Laggas*. There are vast quantities of this resource in the district to support the building industry. However, in some circumstances exploitation is undertaken in a haphazard manner that is detrimental to environmental and infrastructural sustainability. Exploitation of clay for making jikos, roofing tiles and bricks is taking place albeit in small quantities by one self-help group around Maralal. Limited vermiculite mining for glass mining is taking place at Donyo in Waso Division and occasional prospecting for precious stones take place in Baragoi Division. Handmade artifacts and finishes create value in their own right as a result of labour, creativity, and devotion expended in making them.

Bee keeping is widespread especially in the arid zones and along the mountain ranges. Wamba Division is leading in honey production in the district. Income from non-livestock related activities is not as important as that derived from sale of livestock, which is the main income earner in the broader sense of livestock production.

Income from non-livestock related activities include that derived from remittance from children, donation from friends or relatives; seasonal and regular wages; salaries from private and public sector; business income; and pension payments. Among none livestock-earning activities, running of business (kiosks/shop keeping) is more popular albeit it is low economic significance (Oguge, 2005). There is limited exploitation of quarry stones at Soiko Lkokukyu on the way to Baragoi. This resource has not been fully exploited due to communication problems.

Participation helps strengthen the capacities of rural people to gain responsibility for their natural resources. But the meaning may vary widely and is used to cover many activities, for instance the provision of labour, materials or cash; involvement in problem identification; project planning and implementation; community, institution, or individual participation; partnership, enablement or empowerment; or a combination (Barrow E., 1996). It seeks to empower local people to manage their own resources in a sustainable way, create the enabling legal and policy instruments, establish mechanisms for local ownership and responsibility for the process, and ensure that benefits accrue responsibly and equitably.

Naibung'a NRM: Naibung'a conservancy is an initiative of Laikipiak Maasai communities' efforts at incorporating wildlife as a land use into their communally owned livestock ranches in the Ewaso Nyiro Basin. The idea is to balance their use of pastureland for livestock production in co-existence with high diversity and biomass of wildlife, thus allowing for development of eco-tourism enterprises that contributes towards livelihoods.

In the year 1999, the African Wildlife Foundation (AWF) initiated a participatory Natural Resource Management (NRM) planning process in Naibung'a nine group ranches namely; Tiemamut, Kijabe, Koiya, Ilmotiok, Musul, Nkiloriti, Morupusi, Il-Polei and Munishoi. The NRM programme for Naibung'a was developed to promote sustainable use of natural resources while improving economic livelihood of the communities. This involved developing strategies to help the local communities benefit from nature tourism and resources on their land (Oguge, 2005).

The Natural Resource management (NRM) encompassed land use zoning primarily designating the group ranches into zones for conservation, livestock grazing and settlement areas (Legilisho, 2003). It also strengthened local institutions by setting up of management

committees to which there are three: (i) Group Ranch, (ii) Enterprises, Tourism and NRM, and (iii) Grazing, Bee Keeping and Settlement committees.

A review of effectiveness of the NRM on ecosystem health has since been undertaken for the area, Oguge (2005). The KTK NRM was developed in 1999 and between then and 2004, a significant increase in the normalized difference vegetation index (NDVI) in conservation areas of Kijabe and Koiya group ranches has occurred (Plate 1). This indicates an increase in vegetation biomass and thus would suggest an improvement in ecosystem health in the respective conservation areas. Only modest increase in NDVI was noted in the conservation area of Tiemamut group ranch. Conversely, the settlement and grazing areas show significant decrease to no change across most of the landscape. Exceptions are small grazing areas bordering conservation areas in Kijabe and Koiya, respectively. Vegetation change is the best indicator in ecosystems, and given a significant increase in plant cover over a 5-year period, it is plausible to suggest modest success in the role of NRM in reversing the trends in ecosystem degradation. This need be encouraged.

Satellite imagery analyses were corroborated by vegetation data from ground truthing studies. Such vegetation data showed high species richness and diversity in the conservation area of Kijabe ranch indicating that the NRM, to a reasonable extent, has led to the slowing of ecosystem degradation that may now be at an early stage of recovery. That an important forage species *Themeda triandra* was observed only in Kijabe conservation area (which has also indicated increased cover) would suggest that the NRM program's effect on biodiversity conservation here is positive.

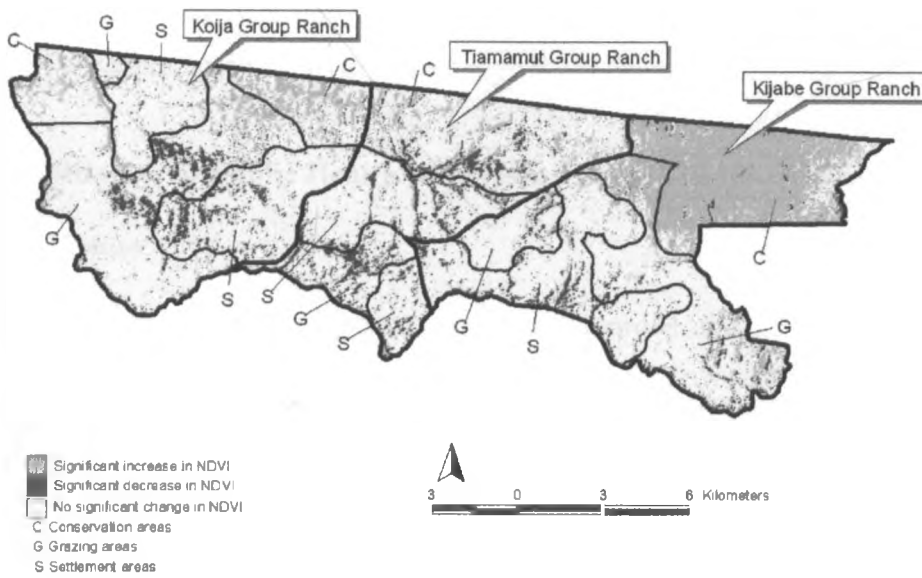


Plate 1: NDVI image differencing results for 2004 and 2000 for LANDSAT ETM+ images (Courtesy: Earth Watch Institute).

Namunyak NRM: Namunyak is in Wamba division within the Sarara and Sapache group ranches. This Natural Resources Management Plan for Namunyak Wildlife Conservancy is an integral part of the Dry land Livestock Wildlife Environment Interface Project (DLWEIP) and provides guidelines and direction for sustainable utilization and management of natural resources within the conservancy for improved community livelihoods, protection of biodiversity, sustainable livestock production, and environmental conservation.

This NRM plans does not offer solution to all the natural resource related problems in the conservancy, but it will provide a simplified and practical approach to the use and management of the natural resources over the plan period. It is anticipated that proper implementation of this NRM plan will enable Namunyak Conservancy to adopt natural

resource use and management practices that will result in a win-win situation for wildlife, livestock, people, and the environment.

3.5. Diseases of Public Health Importance at the Wildlife-Livestock Interface

3.5.1. Rabies

Sylvatic rabies has been diagnosed in 33 carnivorous and 23 herbivorous species in sub-Saharan Africa, including jackals (*Canis mesomelas*), honey badger, mongoose (*Cynictis penicillata*), bat-eared fox (*Otocyon megalotis*), and civet cat in Kenya. Transmitted from wildlife to livestock and vice versa, but domestic dogs thought to be principal reservoir in Kenya. Fatal in all mammalian species. Rabies outbreaks partially responsible for near extinction of endangered wild dogs in the Maasai Mara-Serengeti ecosystems; Incidence increasing over past 30 years.

3.5.2. Brucellosis

Brucellosis is an infectious disease of animals and man caused by several species of bacteria belonging to the genus *Brucella*. The disease is usually acquired by humans through contact with infected animals at parturition or slaughter, or through consumption of infected animal products. In animals, *Brucella spp.* causes abortions, retained placentas, metritis, weak young, arthritis, tendonitis, hygromas, fistulous abscesses, and lesions of the male reproductive tract. Depending on the species, brucellosis is transmitted between animals through contact with products of parturition, ingestion of milk, or venereal exposure.

Bovine and swine brucellosis have been largely eradicated from domestic animal populations of several countries including the United States and Canada, leaving only focal reservoirs of infection in wild ungulates and feral swine. These reservoirs and their potential to influence interstate and global agricultural markets have recently focused increased public

attention on the disease in wildlife. Examples of significant reservoirs of brucellosis in wildlife populations include the following. *Brucella abortus* is present in wild elk and bison in the Greater Yellowstone Area in the US, in bison in Wood Buffalo Park, Canada, and in African buffalo in South Africa and Zimbabwe. Various biovars of *Brucella suis* are common in some populations of wild swine in several areas of the world, hares in Europe, and in caribou in the Arctic. Recently, a group of *Brucella* has been identified in marine mammals. Little is known about the pathogenic or public health potential of these marine organisms.

3.5.3. Anthrax

Anthrax is one of the oldest documented diseases, and the life-cycle *Bacillus anthracis* has both biotic and abiotic components. The abiotic component is the resistant dormant spore phase which occurs in regions with predominantly alkaline soils with high calcium content. The biotic component is the exponential amplification phase, which takes place within the mammalian body, and appears to be the essential reproductive phase. Anthrax outbreaks have been documented in most domestic species in the absence of any wildlife link. Similarly, localised to extensive outbreaks have occurred in wildlife populations with no livestock link. Large-scale outbreaks may cross this interface especially where domestic and non-domesticated species share range and resources in the environmental conditions that are associated with anthrax outbreaks.

3.5.4. Tuberculosis

All indications are that bovine tuberculosis was imported from Europe to the African continent with the livestock of colonial farmers. This disease, therefore, should be categorized as a foreign animal disease in free-ranging African wildlife. There is strong circumstantial

evidence that *Mycobacterium bovis* entered the southern Kruger National Park in the late 1950's, and found an ideal maintenance host in the gregarious African buffalo population.

The infection has subsequently spread northwards between buffalo herds, and currently, only the far northern regions have escaped infection. "Spill over" of infection has occurred into several other potential maintenance hosts such as greater kudu and warthogs, as well as certain incidental hosts such as baboons, lions, leopards, cheetahs, hyenas, a honey badger and a common genet. The continued practice of traditional (fenceless) livestock husbandry in East Africa is likely to have facilitated the spread and establishment of infection in wildlife over a much longer period, perhaps permitting a more stable endemic pattern of infection. Consumption of infected buffalo is considered the predominant route by which lions in the Kruger National Park become infected with *M. bovis* (Keet *et al.*, 2000b). With *M. bovis* confirmed in the wildebeest population, Serengeti lions also are clearly at risk of infection through eating infected prey.

Monitoring, control or containment of this slow, insidious but highly contagious disease is a major challenge to regulatory authorities and conservation officials. Current activities and strategies include active and passive surveillance, genetic fingerprinting and research into environmental survival of the organism, development and evaluation of *ante mortem* diagnostic tests for a range of species, epidemiological investigations in affected species, and evaluations of Bacillus Calmette-Guérin (BCG) vaccination efficacy and upgrading of boundary fences as disease barriers.

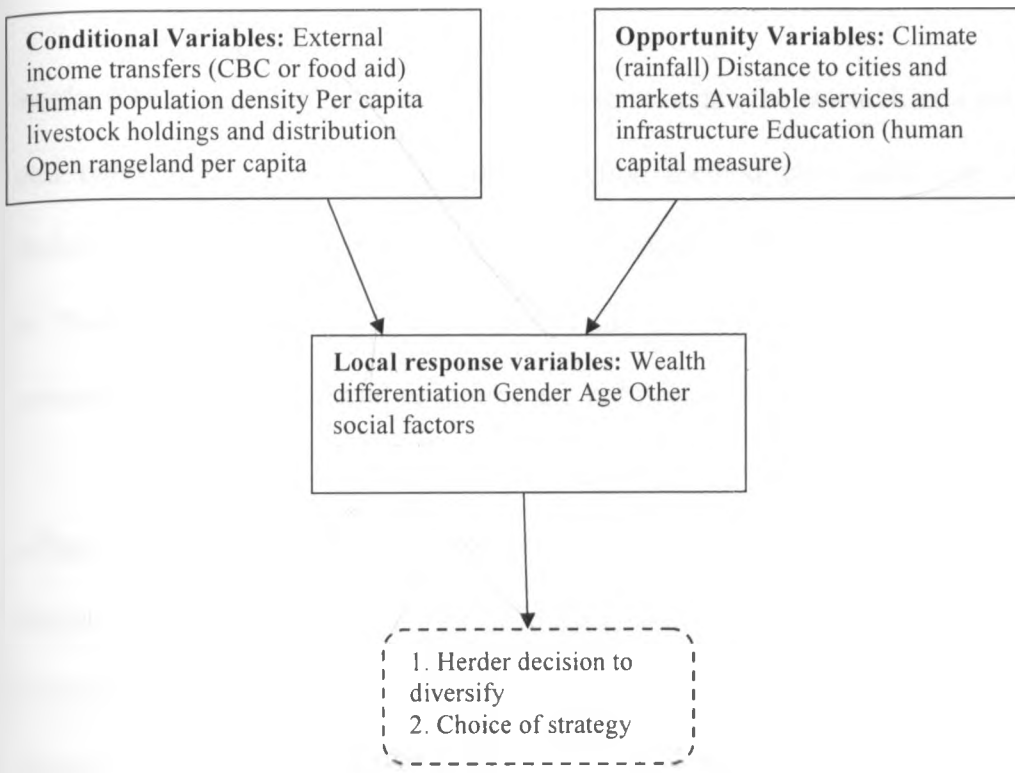
However, the lack of a conceptual framework of diversification among African herders has resulted in contradictory bodies of literature about the potential role of diversification in risk management among pastoral herders (Little *et al.* 2001). As an example, cultivation is regarded by some researchers as a viable risk management strategy (Campbell

1984, O'Malley 2000, Smith 1998). Others view it as an unsustainable option that accentuates risk (Hogg 1987, 1988). Little *et al.* (2001) presented a preliminary model of pastoral diversification (Box 3.1). The authors suggested that this model is highly localized and further theoretical development will require differentiation into three types of variables—conditional, opportunity and local response variables.

Pastoral diversification can be defined as the pursuit of any non-pastoral income-earning activity, including: (1) trading occupations; (2) wage employment; (3) retail shop activities; (4) rental property ownership; (5) sale of wild products (medicinal plants, charcoal); and (6) farming. The relationship between risk and diversification is not necessarily linear (Box 3.1) and may not be the major reason for pastoral diversification (Little *et al.* 2001). In this context, will CBC reduce, or increase Maasai exposure to risk and, secondly, at which scales will CBC affect the livelihood diversification of poorer or wealthier members of a community?

The key question, therefore, is to what extent is pastoral livelihood diversification a function of poverty, a result of investments by the wealthy, or an adaptation to changing opportunities, or other factors? If we are to understand what is driving land use change in the Ewaso Nyiro ecosystem and what the prospects are for land use patterns which are more compatible with wildlife needs, then we will have to examine what is causing people to convert pastureland to conservancies in these group ranches.

Box 3.1: Model of Pastoral Livelihood Diversification (Little et al. 2001)



3.6. Research methodology

Participatory Rural Appraisal (PRA) is a collection of cost effective ways to learn about research situations needed and initiatives of rural people and to collect relevant data for project planning (Waters-Bayer and Bayer, 1994). Tools used include interviewing, diagramming, ranking and mapping. PRA goes further than RRA in actively involving rural people in identifying their problems, seeking solutions and evaluating results.

PRA aim for faster collection of better quality data and speedier analysis than given by conventional questionnaires (Waters-Bayer and Bayer, 1994). However, an important part in both techniques is triangulation, which means looking at things from different perspectives. This involves applying different methods using different source of information collected by different people and crosschecked them in order to obtain more accurate results.

Participatory rural appraisal methods were applied during the survey period. These methods were picked to increase the amount of information that could be collected in the 5

weeks survey period in Ormand as well as to maintain the research as a public collaborative and participatory activity. The data collection method used took into consideration the definition of veterinary anthropology given by Matthias Mundy and McCorkle (1989), which is "folk management of animal health in the context of the whole farming system with consideration for other social economic and political realities."

Household Surveys: One of my first tasks was to draw up a list of households in the village so that I could take proper samples. Households are not straightforward units of analysis (Guyer 1980, Guyer 1981, King-Quizon 1978). Households and their internal patterns of distribution are not static. Households adapt to changing circumstances and come in and out of existence. Households are fluid—rarely fixed in space and time. They are problematic as discrete units of measurement (Guyer 1981, Messer 1983, Mook 1986).

There are some basic units which can be used to collect data about pastoral societies. A basic household (kanji) meant a man ('household head'), his wives and other dependants. Usually, households were grouped in a boma with several households sharing a common livestock enclosure (but different gates). Households sharing a boma are often closely related, such as brothers, or a father and his adult sons. Each woman manages her own 'sub-household' (Maa: enkaji), with men and women assuming different responsibilities in household activities (Brockington 1998).

A pilot survey was conducted for pre-testing the survey questionnaire. Pre-testing the questionnaire aimed at detecting problems with its validity and reliability. We sought to determine whether the words in each question were properly understood, using intended question measurement, respondents' interpretation and range of response (Dillman 1978), where appropriate questions used an open-ended format. Pilot survey respondents were specifically asked to identify which questions they found difficult to answer and why, as well

as how much time they took to answer the questionnaire. They were also asked to provide comments and suggestions about improving the questionnaire.

The pilot survey was conducted exactly as the main survey albeit on a smaller sample scale but on a representative sample of households in four group ranches in Laikipia and one group ranch in Samburu. The pilot survey respondents were selected based on the fact that they are all indigenous of the conservancies with better knowledge of the region and interacting factors. This group provided the researcher with preliminary local community content and concept at this stage. Furthermore representative sample group were identified with those whose family are involved in natural resource management in the conservancies, staff of the community eco-lodges.

Generally, we considered them strategic since they grew up in the community and are both part of the community homogeneity and also scientifically knowledgeable enough to represent their constituency. Some group ranch members are directly supervising the community tourism and environmental management group and local Non-Governmental Organizations (NGOs). The administered questionnaires from the pilot test were carefully scrutinized for sections that respondents had difficulty answering or understanding. Ambiguous questions were reframed to boost response rate in both institutions and local communities.

The main survey was implemented using the questionnaire modified from the pilot survey. The final questionnaire consisted of 49 sub-section questions in a well-organized manner. Questionnaire component was designed to specifically treat subjective issues of CBC. The questionnaires (primary source) were administered accordingly to households that have been identified as appropriate respondents based on two criteria among others: (a) possession of sufficient knowledge, and (b) adequate level of involvement concerning the

issues under investigation (Campbell et al. 1956). Some of the questions in the questionnaire required Yes or No answers, while others were open-ended. There were also questions with various options available for the respondents to choose from.

To ensure the validity of the data and ensure that the key informant has been isolated, validation items were included in the research instrument. These items were used to verify that the individuals who responded were fully qualified to provide the information requested. A researcher personal administration as well as research assistants was adopted. In addition to the use of questionnaire, data were collected through key informant interviews, as well as group and direct discussions with key members of the FG. The interviews also provided another way of validating (triangulating) the results from the administered questionnaire.

The interview format was based on the focused interview as described by Merton and Kendall (1956) and Judd et al. (1991). Originally, Merton and Kendall (1956) described two requirements for this type of interview: the persons interviewed have to be involved in a particular situation, and the interviewer has to theoretically analyze the situation beforehand. Judd et al. (1991) broadened the definition of a focused interview to include any interview in which interviewers know in advance what specific aspects of an experience they wish to have the respondent cover in their discussion, whether or not the investigator has observed and analyzed the specific situation.

The study also used focus group discussion and Semi Structured Interview (SSI) and key informant interview. Focus groups (FGs), in addition to generating detailed information regarding specific issues (e.g. importance of group ranches as a form of land tenure and land use), are also useful for illuminating the attitudes of the participants (i.e. towards wildlife conservation, ethnoveterinary knowledge etc.).

Semi-structured interviews (SSIs) are generally utilized to generate in-depth information and as a means of obtaining comparable data across a sample group. Semi-structured one-on-one interviews were selected as the primary means of data collection because of the desire for in-depth information, cultural norms that require relationships be built prior to asking personal information, and also due to practical considerations regarding low levels of literacy among many individuals in the area that prevent the usability of written surveys and similar methods.

In considering the reliability, I recognized that although studies based on participant recall is a dominant method of researching the subject matter, this method has inherent limitations. Certain procedures have been suggested to help reduce their impact such as the use of multiple informants (Kumar et al. 1993) though such methodologies do not guarantee objectivity. The aim of the interview is to confirm the reliability of data collected using questionnaire and alleviate possible biases (Eisenhardt and Bourgeois, 1988; Huber and Power 1985; Kumar et al. 1993).

Archival records documenting the process and its characteristic were collected prior to each main interview and all the discussions were carefully written down. This enabled us to have direct access to the original discussion and pay attention to any part of it at the later stages of the study. Caution was exercised to minimize distortion and memory failure problems. For instance, by selecting recently taken decisions, (Mintzberg et al. 1976) interviewing only major participants with an intimate knowledge of the process (Kumar et al. 1993), crosschecking interview-derived information against other respondents' recollections, and also by cross-checking interview data with other available sources of information.

There was the willingness and sincerity with the group ranch members and management committees to participate in the discussion. We also tried to minimize social

desirability bias. One source of inaccuracy is tendency of survey respondents to offer socially desirable answers (Dillman 1978). To reduce such bias from respondents, the purpose of the study was made clear in the cover letter, questionnaire, and introduction to the individual being interviewed.

Furthermore, the confidentiality of every respondent was assured with the given explanation that data was to be analyzed to produce aggregate statistics only. In addition, documents were collected from the regional government authorities regarding community based natural resource management policies and management functioning, strategic processes of administration and community involvement. Available information were obtained from several sources including the conservation research groups; African Wildlife Foundation, Earth Watch Institute, Samburu Community reserve initiatives publications of related works within and outside Kenya. Other sources of data consisted of annual reports, scholarly books, journals, and internet sites and online databases .

4.0. Chapter Three: Materials And Methods

4.1. Study Design and Methodology

Introduction

In this section, the study design, variable selection methods, sampling procedure and data analysis procedures are discussed.

4.2. Study Design

The study used both qualitative and quantitative participatory methods. A pilot survey and a main survey were carried out. Key indices considered in the field design included eco-tourism, land tenure and land use, socio-economic utilization and conservation of wildlife and public health implications of wildlife conservation.

4.3. Data Collection Methods and Sampling Techniques

Primary tools for data collection were used included community sketch maps, transects walks, key informant interviews, semi-structured questionnaire, maps and photos, focused group discussion and semi-structured interviews (SSIs). Other primary methods of data collection included observing herding practices, grazing strategies, and community sanctuaries. Secondary sources of data were based on annual reports, scholarly textbooks, journals, and internet sites, online databases.

4.3.1 Study Area

This study was carried out in Naibung'a Conservancy, Laikipia District and Namunyak Wildlife Conservancy, Samburu District Ewaso Nyiro Ecosystem, Northern Kenya (Figure 4.1). Naibung'a Conservancy is found within Mukogodo division of Laikipia North district and composed of nine group ranches occupying a stretch of land along the northern border of Laikipia and Isiolo district. The nine group ranches are part of the large Mukogodo pastoral

system and include Tiemamut, Kijabe, Koiya, Ilmotiok, Musul, Ilkiloriti, Morupusi, Il-Polei and Munishoi.

Namunyak Wildlife Conservancy is located in the Ngilai West location of Wamba Division of Samburu East District in the Rift Valley Province of Kenya. The conservancy covers an area of 100,000 acres and encompasses the Uarges, peak of the Mathews' range, and Ololokwe the southernmost hill of the range.

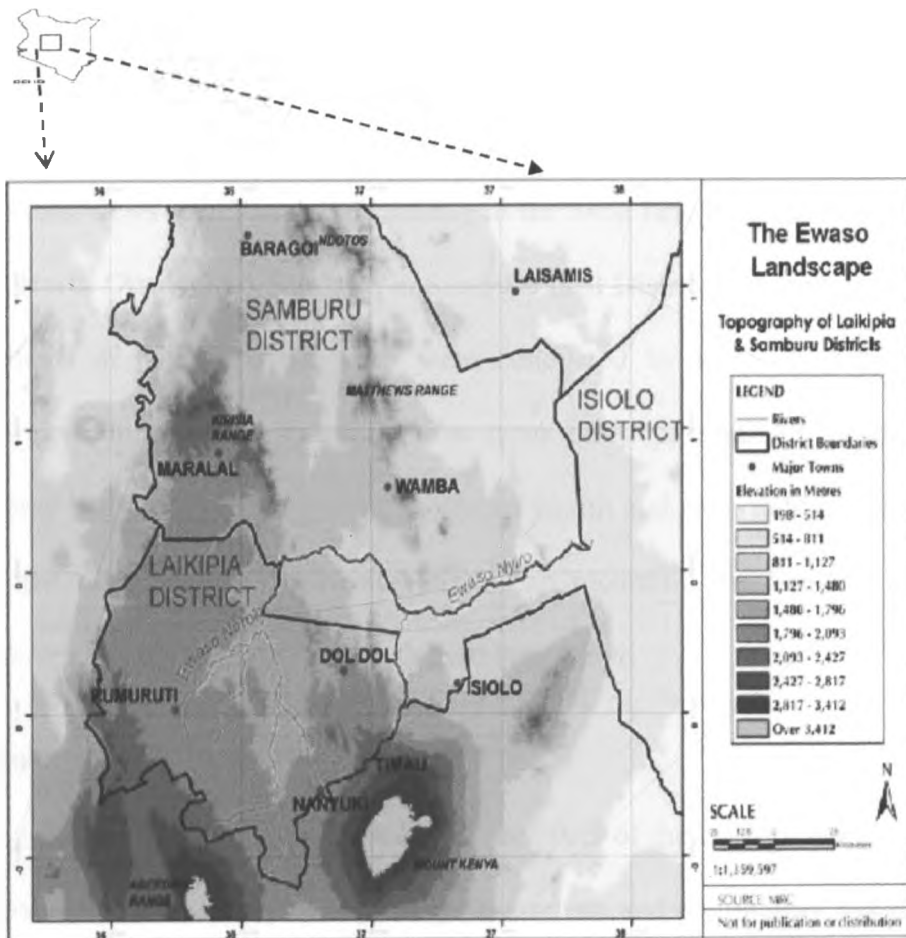


Figure 4.1: A topographic map of Ewaso Nyiro Basin and location in Kenya (adapted from King and Malleret-King 2006)

4.3.2. Mapping and GPS

Community sketch maps constructed to develop profiles of land use, soils, livestock, trees/shrubs and wildlife. Hand held Global Positioning System (GPS) was used to record the location of sampled households in the conservancies (Annex 7.2).

4.3.3. Semi-Structured Questionnaire

Semi-structured questionnaires were administered to 108 randomly selected households from Kojja, Tiemamut, Kijabe and Nkiloriti Group Ranches in Naibung'a Conservancy and (30) households in Sapache Group Ranch in Namunyak.

The interviews were conducted mainly in the local languages (dialects of Maasai and in Laikipia North District and Samburu in Samburu East District), as well as the more widely spoken Swahili in both districts. They were conducted by local enumerators who were experienced in administering questionnaires from other pastoralist's household surveys. However, they had no prior background in animal health and were deliberately recruited and trained so that there was no enumerator-bias when recording the farmers' responses. The enumerators worked closely with author as their supervisor.

4.3.4. Focused Group Discussion

Two focus groups (n=10) were conducted with members of the NRM committees to generate detailed information on key topics regarding pastoralism and community based conservation (e.g., importance of group ranches as a form of land tenure and land use, advantages and disadvantages of wildlife presence in these group ranches). The FGs were also used to assess the existing best natural resource management practices as well as the opportunities for improving these practices for peaceful coexistence of livestock, wildlife, and people in Naibung'a and Namunyak conservancies.

The participants were also asked to give a list of diseases of public health importance that affected livestock as well as humans in the last year. When responses provided were not specific, probing was used in a bid to characterize the syndrome while avoiding leading the respondents towards a specific diagnosis. The five most important diseases were then identified through pairwise ranking and their relative incidences determined through disease incidence scoring. The first step in this exercise was to ask the respondents to divide 100 beans into two groups representing 'sick animals in the last year' and 'healthy animals in the last year'. As soon as the respondents accepted the scores given, they were asked to give reasons that explained the patterns described by the scores.

Thereafter, the respondents were asked to subdivide the pile of the sick animals to show the relative numbers of animals that suffered from each of the five diseases identified above. An extra circle representing other diseases was always provided. Finally, the respondents were asked to further divide the piles for each disease into the numbers of animals and people that were still alive and those that had died for estimation of case fatality rates. Disease incidence scoring was always followed by discussions on ways in which the most prevalent diseases were being managed by the stock owners.



Plate 2: Discussing with key members of the FG in Il-Polei group ranch in Naibung'a conservancy.

4.3.5. Semi-Structured Interviews

Twenty semi-structured interviews (SSIs) with stakeholders in the Naibung'a and Namunyak conservancies were conducted, recorded, and transcribed. Interviewees were primarily NRM committees ($n = 10$) and group ranch members ($n=10$). SSI was applied in this study to obtain information on critical natural resource management issues facing the community conservation in these areas and the proposed interventions to these constraints. Participants were identified using a snowball sampling approach; an initial list of individuals was generated based on recommendations of a local area chief. At the conclusion of the interviews, participants were asked to recommend names of other individuals to interview. Interviews with individuals from a specific stakeholder group (e.g., Scouts, NRM committees, community members) were continued until the researchers determined that a sufficient repetition and salience of themes had emerged. The length of the interview ranged between 30 and 60 minutes.

4.3.6. Key Informant Interviews

These were conducted with individuals selected from both the local villages (n=4), conservation partners (n=5), employees of Namunyak (n=5), Naibung'a (n=4), and government administrative personnel (n=2) for example chiefs about existing best natural resource management practices that promote compatibility of wildlife conservation and pastoralism in their group ranches.

The respondents were informed in advance in order to schedule for an interview date with him or her. Key informant interviews were also applied in this research to assess the knowledge of community members about diseases of economic and public health importance at the wildlife-livestock, their management, and control practices used. The community members reported diseases at the wildlife-livestock interface both of economic and public health importance in local and or English terms. The equivalent English terms were used on the analysis.

4.3.7. Transects

Transects walks along the selected transect routes as well as questionnaires administration were conducted on the selected households based on the sampling techniques later described. In addition to questionnaire administration, observations, note taking, photography, recording herd practices were also used to collect data. During the transects walk within each group ranch, a landmark for example school, dispensary, church, local administration's camp or shopping Centre was identified. The households were selected randomly using the sum of digits of the current date. For example, if the enumerators entered the group ranch on August 21st, they would add up the two digits of the number 21 ($2+1=3$) selected the third household from the land mark to serve as a starting household.

The subsequent households were selected by employing a random walk, combined with a specified household skip routine. That is, enumerators would move to their left and skip over the first ten households they encountered after the previous selected household, selecting the 11th household for participation in the research. This ensured that respondents were relatively spread out across the group ranch. In the event a selected household contained no individuals who were eligible to participate in the study or the household was empty, the enumerators proceeded to the adjacent household to conduct the interview, and afterwards resumed the standard 10-household skip routine.

In the event a selected residence was a compound or Manyatta, rather than a single family household, the enumerators used a household selection grid to randomly select a household within the compound, such that each household had an equal probability of selection.

4.5. Data Analysis Procedure

All data from the questionnaires were entered in a fully relational database specifically designed for this purpose using Microsoft ACCESS 2007 (Microsoft Corporation). The relational database structure minimises data entry errors, increases data entry efficiency and maintains a high level of data integrity. SPSS statistical package 13 for the windows was used to calculate summary descriptive statistics and frequency tables. Microsoft EXCEL 2007 (Microsoft Corporation) was used to present data in graphs and histograms.

5.0. Chapter Four: Results, Discussion, Conclusion and Recommendations

Introduction

This section discusses findings of the study, which are the trade-offs that promote sustainable integration of community based conservation and livestock keeping. This section also discusses the household's demographics which include age, sex, marital status; level of formal education, number of dependants, number of wives, and the number of years lived in the village and livestock holdings among households. Community knowledge on the occurrence and potential impacts of zoonotic diseases is also discussed.

5.1. Results And Discussions

5.2. Household Socio-Economics

The study sampled out 108 households in the study area for administration of questionnaires, of which 78 (72.2%) were from Naibung'a in Mukogodo division of Laikipia North District while 30 (27.8%) were from Namunyak in Wamba division of Samburu East District s shown in the table below.

Table 5.1: Number of households in Naibung'a and Namunyak conservancies

Districts	Division	Group Ranch	# of Households Sampled
Laikipia North	Mukogodo	Tiemamut	12
		Il-Polei	18
		Kijabe	23
		Koiya	25
		Total	78
Samburu East	Wamba	Sapache	30
Total			108

5.2.1. Sex and Age Category of Households Heads

In Naibung'a, (72%) 54/72) were male respondents while (28%) 21/78) were female respondents, whereas in Namunyak (56.7%) 17/30) were male respondents and (43.3%) 13/30) were females respondents.

In Naibung'a, the majority of the household heads were in the age category 25-34 years (39%) while others household heads were in the age category of 18-24 years (15.6%), 35-44 years (20.8%) and over 45 years (24.7%). In Namunyak, the majority of the household heads were in the age category of over 45 years (33.3%) followed by age category of 35-44 years (26.7%). The least of the household heads were in the age categories of 25-34 years (23.7%) and 25-34 years (16.7%). This shows that nearly equal number of respondents in the age category of 18-24 years from both areas participated in the survey while the highest number of respondents from Naibung'a conservancy (39.0%) participated in the survey as compared to Namunyak in the same age category (Figure 5.1).

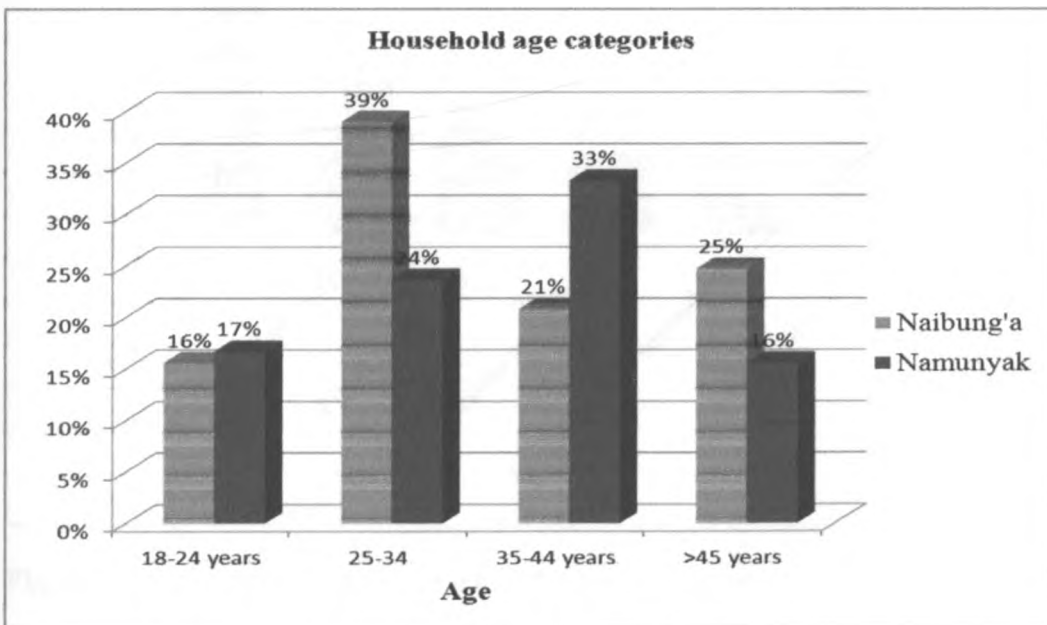


Figure 5.1: Age Categories of Households Heads

5.2.2. Level of education Attainment

In this study, education attainment was generally low with the highest level of illiteracy in Namunyak. In Naibung'a, the majority of the respondents (38.3 %) are those who have not gone to school, while (14%) had attended some primary school, (20.3%) had completed primary, (8.2%) had attended some secondary school, (18.1%) completed secondary school, and (1.1%) had attended college.

In Namunyak, most respondents had not received any schooling (48.7%) while (17.6%) had attended some primary school, (15.4%) had completed primary, (10%) had attended some secondary school, (7.3%) completed secondary school, and none had attended college (Figure 5.2).

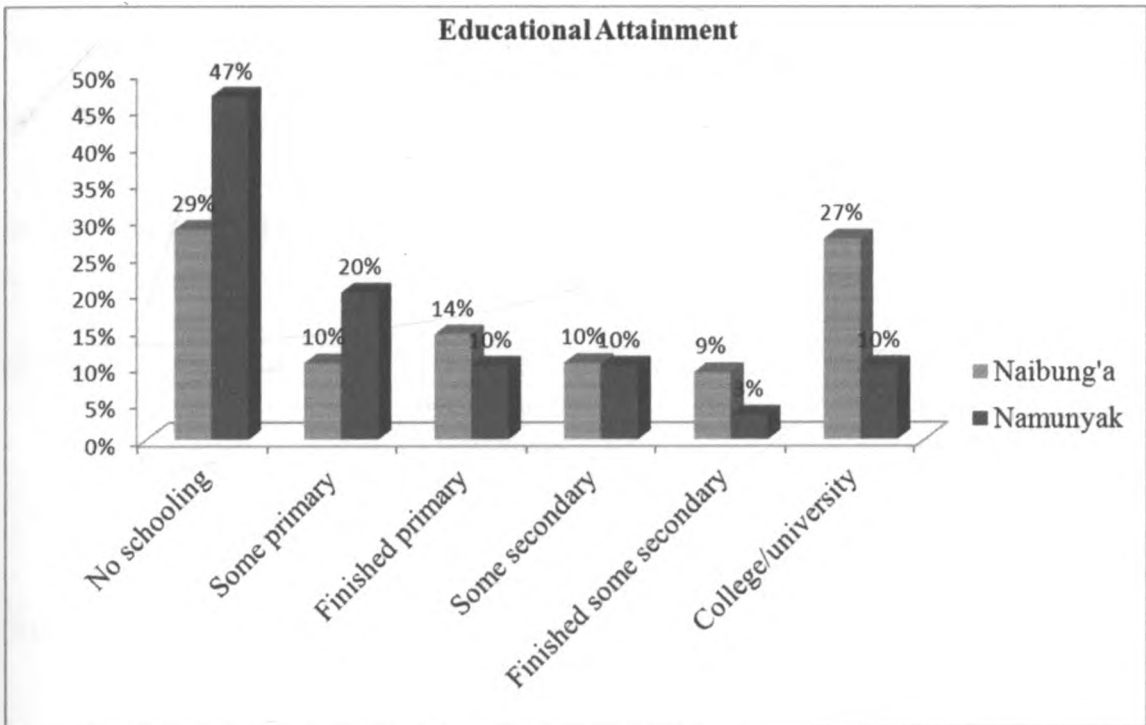


Figure 5.2: Household heads last/highest level of education

5.2.3. Number of Years Lived In the Group Ranch

In this study, there was uneven distribution of how long people had lived in the area for in both Naibung'a and Namunyak respondents. Most respondents in Naibung'a (70.1%) lived in the group ranch for more than 20 years while (13.0%) lived between 11-20 years. The smallest segments of the respondents were those who lived between 1-5 years (9.1%) and 6-10 years (7.8%).

The majority of the respondents (40%) in Namunyak lived in the group ranch for more than 20 years while (33.3%) lived between 11-20 years. The smallest segments of the respondents were those who lived between 1-5 years (6.7%) and 6-10 years (20%) as shown in Table 5.2. This is compatible with a pastoral way of life in such an area and relates to movement in such of pasture and water. The increased sedentarization may also relate to increased pressures to settle and sub-divide the land.

Table 5.2: Number of Years Lived in the Area

CBC			Frequency	Valid Percent
<i>Naibung'a</i>	Valid	1-5years	7	9.1
		6-10 years	6	7.8
		11-20 years	10	13.0
		More than 20 years	54	70.1
		Total	77	100.0
	Total		78	
<i>Namunyak</i>	Valid	1-5years	2	6.7
		6-10 years	6	20.0
		11-20 years	10	33.3
		More than 20 years	12	40.0
	Total	30	100.0	

5.2.4. Marital Status

In Naibung'a, the majority of the respondents (84.9%) had one spouse. The other respondents had two wives (11.3%), (1.9%), three wives and (3.1%) had more than four wives. In Namunyak, the seventy-five percent of respondents had one wife, (16.7%) had two wives, and (8.3%) had four wives (Figure 5.3). The result shows that the marital status of household heads in both areas shows no significant differences. The number of wives is an important factor in determining the economic option to be taken by the household in order to feed his family.

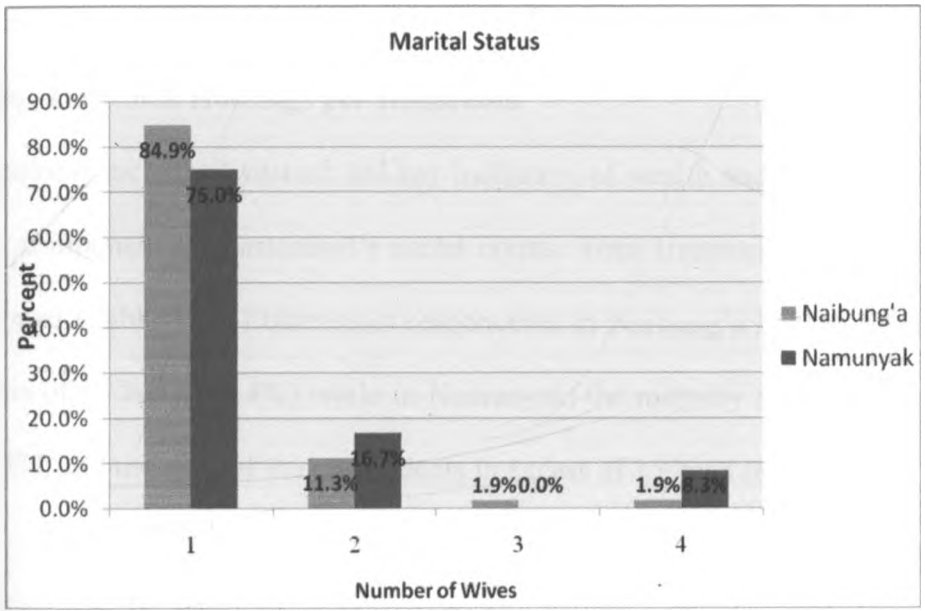


Figure 5.3: Marital status

5.2.5. Manyatta Composition

The research finding indicates that all households in both areas had sons or daughters living with them. In Naibung'a, the majority of the respondents (88.2%) and (82%) had between 1-3 sons and daughters respectively. In Namunyak most of the respondents (66.6%) and (65%)

had between 1-3 sons and daughters respectively. Table 5.3 indicates the composition of other siblings and people living in the Manyatta.

Table 5.3: Manyatta Composition

Conservancy	Number	% sons	% daughters	Male relatives	Female relatives
<i>Naibung'a</i>	1-3	88.2	82	50	69.3
	4-5	4.0	7.7	31.8	7.7
	>6	7.8	10.2	18	23
<i>Namunyak</i>	1-3	66.6	75	75.0	100
	4-5	25	16.7	25.0	-
	>6	8.4	8.3	-	-

5.2.6. Livestock Holdings per Household

In pastoral societies livestock are key indicators of wealth and well being, as well as being a vital component for pastoralist's social norms. Total livestock holdings per household were analyzed (Table 5.4). Either most respondents in Naibung'a had no livestock (21.5%) or in excess of 15 head (43.4%) while in Namunyak, the majority are those who had no livestock (63.3%) and the least of the respondents in excess of 15 head (8%).

Livestock possession is a central element of one's social, economic, cultural and religious life. Without livestock, one is lost, as one will not have social status, power and cannot support a family. Animals form an integral part of social life and ideological values that guarantee the survival of individuals and the continuity of institutions. To pastoralists therefore, livestock are insurance as they provide social links through bride price, inheritance and as ritual objects.

Table 5.4: Livestock Owned

Conservancy	Number of stock owned	% Cattle	% Sheep	% Goats	% Camel	% Donkeys	% Total
<i>Naibung'a</i>	0	1.9	-	-	33.3	12.5	9.5
	1-5	24.5	1.5	-	55.5-	81.3	21.5
	6-10	30.3	4.5	7.9	-	-	8.5
	10-15	13.3	6.1	4.8	6.3	11.1	8.3
	>15	30.4	87.2	88.3	11.1	-	43.4
<i>Namunyak</i>	0	57.7	37.9	31	93.1	96.6	63.3
	1-5	34.5	17.2	24	3.4	3.4	16.5
	6-10	3.8	27.5	10.3	3.4	-	9
	10-15	3.8	3.4	6.9	-	-	2.8
	>15	-	13.7	27.4	-	-	8.0

Table 5.4 shows unequal distribution of livestock amongst the population in Naibung'a and Namunyak. Such an unequal distribution is not unusual in pastoral societies, and has to be understood in the context of pastoralism, the social linkages and obligations, resource sharing and recurrent drought amongst others. This is a subject beyond the scope of this research, but is well addressed in literature on pastoralism.

5.3. Knowledge, Attitudes, Practices, and Wildlife Utilization

5.3.1. Eco-Tourism Benefits

In Naibung'a, the majority of the respondents (70.8%) and significant though slightly less than half (40%) of the respondents in Namunyak reported that tourists coming to the community wildlife sanctuaries help pastoralists in a number of ways. Though sale of beaded items topped in both lodges at (54.1%) and (71.4%) respectively, community members benefited both directly and indirectly (Table 5.5). In Naibung'a, (27%) stated that they created employment, (2.7%) social amenities, (5.4%) revenue collected goes to community projects

and (10.8%) reported that they help in paying school fees. However, in Namunyak, only help in paying school fees (28.6%) was reported.

Table 5.5: Eco-tourism benefits

Community Conservancy	Eco-Tourism benefits	Frequency	Valid Percent
<i>Naibung'a</i>	Beaded items for sale	20	54.1
	Paying school fees	4	10.8
	Creation of employment	10	27.0
	Social amenities established in the area e.g. schools Like Ngabolo primary school	1	2.7
	Revenue collected goes to community projects	2	5.4
	Total	37	100.0
<i>Namunyak</i>	Beaded items for sale	5	71.4
	Paying school fees	2	28.6
	Creation of employment	-	-
	Social amenities established in the area e.g. schools Like Ngabolo primary school	-	-
	Revenue collected goes to community projects	-	-
	Total	7	100.0

One of the basic tenets of ecotourism is to engage local communities so they benefit from conservation, economic development and education. While nearby inhabitants are those most directly affected by the establishment of parks and protected areas, they also stand to profit the most by their conservation. By bringing residents into the business of ecotourism, not only can local people meet their economic needs, but they also can maintain and enhance the "sense of place" that is critical for guaranteeing long-term conservation.

The Conservancy works closely with indigenous and other local groups to establish community businesses, provide tourism training and marketing assistance, and develop compatible economic activities such as handicraft production and tour guiding. This focus on

people reflects the Conservancy’s commitment to work across landscapes, incorporating a concern for human populations as well as for the natural world we inhabit.

5.3.2. Respondents’ Awareness of Poaching

In both areas, ninety percent of the respondents reported that there was no poaching taking place in these areas; however, (10%) of the respondents reported that poaching was taking place. The respondents were further asked if they knew who was behind the poaching. They reported that the local residents were least involved (Figure 5.4).

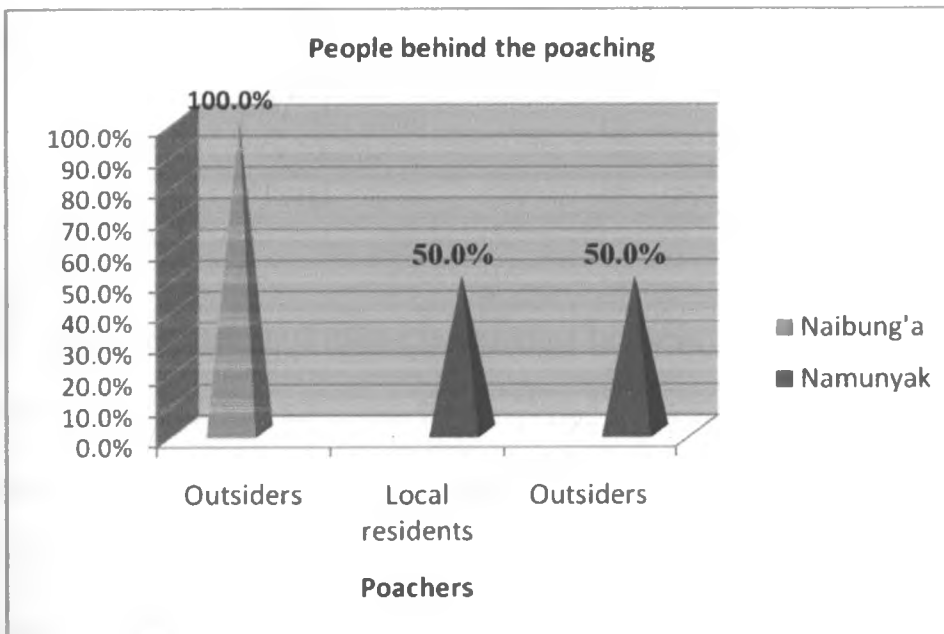


Figure 5.4: People behind the poaching

5.3.3. Animal Species Most Threatened By Poaching

In Naibung’a, 42.9% of the respondents reported that the elephants were the ones killed mostly by poachers. Other species were also threatened by poaching as follows; gazelles (28.6%), Zebra and greater kudu at (14.3%). Elephants were poacher’s favourite species due

to illegal trade of its ivory. In Naibung'a, ninety three percent of respondents reported that elephants were the most poached animal in the area and mainly by outsiders (Table 5.6).

Table 5.6: Animal species most threatened by Poaching

Name of CBC	Species threatened	Frequency	Valid Percent
<i>Naibung'a</i>	Zebra	1	14.3
	Gazelles	2	28.6
	Greater kudu	1	14.3
	Elephants	3	42.9
	Total	7	100.0
	Total	78	
<i>Namunyak</i>	Zebra	-	-
	Gazelles	-	-
	Greater kudu	-	-
	Elephants	28	100.0
	Total	30	

5.3.4. Killing of Birds to Adorn Circumcision Initiates

In Naibung'a (72.4%) of the respondents reported that killing of birds to adorn circumcision initiates was partially in practice while (18.4%) and (89.2%) reported that is fully and partially practiced respectively. In Namunyak, the majority of the respondents (56.7%) reported that killing of birds to adorn circumcision initiates was fully in practice. The least of the respondents (6.7%) reported that traditional killing of birds is no longer practiced.

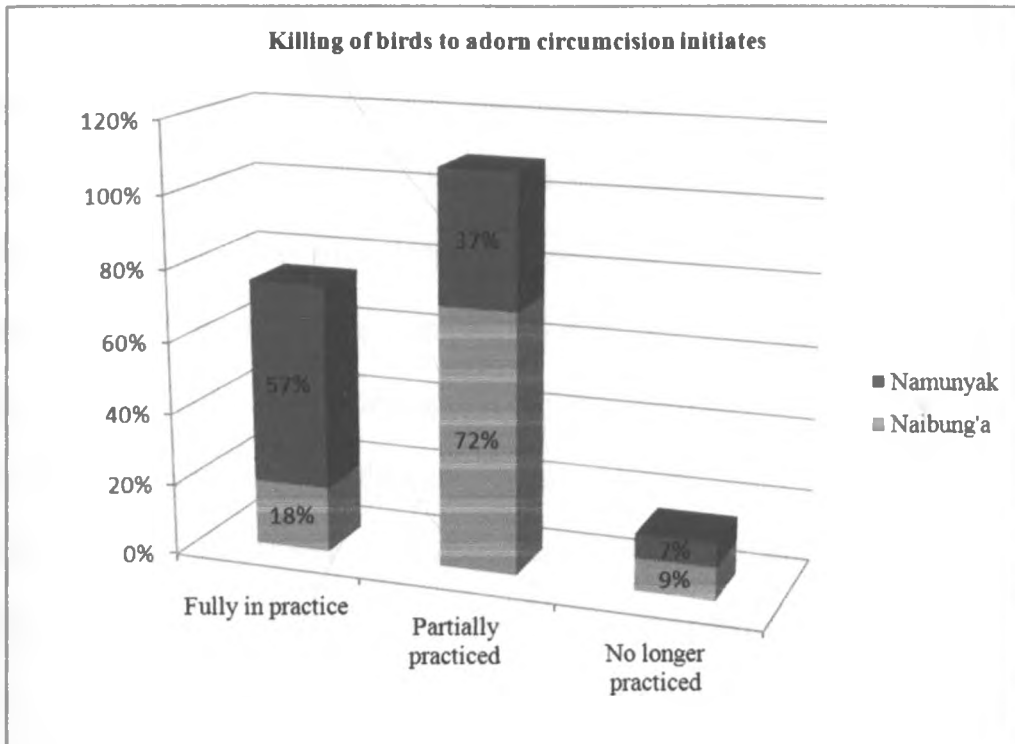


Figure 5.5: Killing of Birds to Adorn Circumcision Initiates

5.3.5. Warriors Hunting Lions To Show Bravery (Ilamaiyo)

The study findings show that (98.7%) of the respondents in Naibung'a reported that lions were still-hunted as a sign to show bravery by the warriors whereas (100%) of the respondents in Namunyak reported that the practice was no longer in existence in the area. Only (1.3%) reported that killing of lions as a sign to show bravery by the warriors was still fully practiced.

5.3.6. General Attitudes Towards Wildlife

To capture the status of the respondents' perceptions towards wildlife, a set of nine statements were posed to all the respondents in this study in Namunyak and Naibung'a community conservancies. In both conservancies, the majority of the respondents (99%) reported that there has been change of attitude towards game meat while (0.1%) reported no change of attitudes.

In Naibung'a, the majority (84.4%) strongly agreed with the statement that **wildlife was important to them**. A significant small number of the respondents either agreed (10.4%) or strongly disagreed (5.2%) that wildlife was important to them. In Namunyak, the response to the same question was overwhelmingly clear and positive: (96.7%) of the respondents strongly agreed that wildlife was important to them. None were undecided on the issue and a paltry (3.3%) agreed with the statement. It is highly likely that the respondent's perceptions in both areas were influenced by the benefits from the CBC. They knew that it was because of wildlife that the benefits were getting to them. Without the wildlife there would accrue no benefits to them. The benefits were directly linked to the presence of wildlife on their land.

Regarding the second statement, (92.1%) of respondents in Naibung'a strongly agreed that **wildlife conservation was important to society and future generations**. The least of the respondents (1.3%) were on the disagreeing side. On the other hand, (96.7%) of respondents in Namunyak strongly agreed with the statement. The rest (3.3%) only agreed. The responses were also a clear indication that respondents in Namunyak attached great importance to wildlife.

The third statement suggested that **the respondents' land be left open for free movement of both livestock and wildlife while generating benefits to the group ranches**. For respondents in Naibung'a, 80.5% of them or strongly agreed with the statement. On the other hand, respondents in Namunyak agreed even more: (93.3%) of the respondents strongly agreed with the statement. None were undecided. The CBC had influenced their decision. The other important aspect of this response was the strong indication that the respondents were aware of the importance of wildlife as a source of income and was ready to accommodate it on their land as long as it generated income for them.

When the opposite of the statement was posed to the respondents i.e. **leaving the land open without benefits to the group ranches**, the opposite was seen in the response: Respondents in Naibung'a either disagreed (26.3%) or strongly disagreed (47.4%) with the statement. For respondents in Namunyak (16.7%) strongly disagreed with the statement. The difference may be attributed to the fact that the respondents in Namunyak were more sympathetic to wildlife even when benefits were not the main driving force because they were already enjoying some benefits.

The next statement was a proposal **to have both livestock and wildlife sharing resources i.e. water and pastures**. For respondents in Naibung'a, 88.3% either agreed or strongly agreed with the statement. The rest were either undecided or in disagreement. On the other hand, (93.3%) of respondents in Namunyak either agreed or strongly agreed with the statement. The significance of this difference is that once again respondents in Namunyak showed more agreement with wildlife-related issues than their counterparts in Naibung'a.

In the next statement about **the development of tourist related activities in the area**, 93.5%, of respondents in Naibung'a either agreed or strongly agreed (most of them strongly agreeing) that tourist activities be developed in the conservation area. Interestingly, their counterparts in Namunyak were more in agreement with the statement; all of them (100%) strongly agreed that tourist ventures be developed in the area.

80.5% of respondents in Naibung'a either agreed or strongly agreed (most of them strongly) with the statement that **the conflict minimisation methods by the Kenya Wildlife Service were adequate**. Similarly, (70%) of respondents in Namunyak strongly agreed with the same statement. On the contrary only (5.2%) of the respondents were undecided on the matter. The responses were positive due the fact community members reported that wildlife was an important asset to both parties (those in Namunyak, Naibung'a and the KWS). But one

of the biggest bottlenecks to wildlife conservation in the area and in many other parts of the country was the manner in which Kenya Wildlife Service and by extension the government handled issues relating to conflict between wildlife and group ranches and their property. In 1989 the Wildlife Conservation and Management (Amendment) Act was enforced. Part of its effect was to strike off compensation for property. Even for the death or injury of a person, the highest amount payable was set at KSh. 30,000.

Similarly, (70.4%) of respondents in Naibung'a felt that **the government's methods of revenue sharing were fair**. All Responses in Namunyak equally supported the view (100%) of them rated as fair the government's methods of revenue sharing.

94.8% of respondents in Naibung'a either agreed or strongly agreed that **the CBC was an adequate method for saving wildlife outside protected areas**. Interestingly, none of the respondents were undecided on the matter. On the other hand all of respondents in Namunyak strongly agreed that the CBC was an adequate method of saving wildlife outside protected areas. More importantly, none at all disagreed with the statement. That could be an indicator of how popular the CBC was both to these pastoral communities. Table 5.7 shows scores by percentage in both community conservancies.

Table 5.7: General Attitudes towards Wildlife

Statements	1	2	3	4	5
Naibung'a					
1. In this area wildlife is important to you	84.4%	10.4%	-	5.2%	-
2. Wildlife conservation is important to society and future generations	92.1%	6.6%	-	1.3%	-
3. This area should be left open for both livestock and wildlife if there are benefits to the community	80.5%	11.7%	3.9%	3.9%	-
4. This area should be left open for both livestock and wildlife even without benefits to the community	19.7%	3.9%	2.6%	26.3%	47.4%
5. Livestock and wildlife should be left to share basic resources like water and pastures	75.3%	13.0%	-	11.7%	-
6. Development of tourism related activities should be encouraged	93.5%	3.9%	1.3%	1.3%	-
7. Government policy on revenue sharing with communities is fair	74%	9.1%	1.3%	9.1%	6.5%
8. KWS' conflict minimization methods are adequate	72.7%	7.8%	5.2%	9.1%	5.2%
9. Wildlife conservation through establishment of community conservancies is a sustainable method for saving wildlife in this area	80.5%	14.3%	1.3%	3.9%	-
Namunyak					
	1	2	3	4	5
1. In this area wildlife is important to you	96.7%	3.3%	-	-	-
2. Wildlife conservation is important to society and future generations	96.7%	3.3%	-	-	-
3. This area should be left open for both livestock and wildlife if there are benefits to the community	93.3%	6.7%	-	-	-
4. This area should be left open for both livestock and wildlife even without benefits to the community	76.7%	13.0%	-	3.3%	16.7%
5. Livestock and wildlife should be left to share basic resources like water and pastures	93.3%	6.7%	-	-	-
6. Development of tourism related activities should be encouraged	93.3%	6.7%	-	-	-
7. Government policy on revenue sharing with communities is fair	100%	-	-	-	-
8. KWS' conflict minimization methods are adequate	100%	-	-	-	-
9. Wildlife conservation through establishment of community conservancies is a sustainable method for saving wildlife in this area	100%	-	-	-	-

1=Strongly Agree, 2=Agree, 3=Undecided, 4=Disagree, 5=Strongly Disagree

5.4. Community Based Natural Resource Management (CBNRM)

5.4.1. Land tenure and Land Use Strategies

The leading land tenure system in both areas surveyed is titled communal at (99%), followed by individual titled land ownership at one percent. Maps and photos of the conservancies were taken focusing especially the contrast between the conserved areas and the grazing land. Eyeballing this landscape shows over utilization of pasture in rangelands outside core conservation areas. For instance, there is more grass biomass in the core conservation area of Namunyak than outside where grazing is not controlled (Plate 3).



Plate 3: Naibung'a conservancy showing differences in grass biomass (Left) overgrazed and (Right) core conservation area around Olentile Eco-Lodge (pictures by Olesarioyo)

Figure 5.8: Land tenure in Naibung'a and Namunyak

When the respondents were asked their opinion on how the zoning strategies introduced in the group ranches helps to promote sustainable use of natural resources and wildlife conservation. In Naibung'a, the majority of respondents (81%) stated that it promoted sustainable use of natural and conservation of wildlife against a small percentage (27%) of

their corresponding counterparts in Namunyak. Respondents were also asked if these group ranches, zoning strategies helps in during drought periods.

In Naibung'a, the study results show that least of the respondents (4.8%) agreed while in Namunyak (40%) seems to agree that the conservancies act as grass bank during drought periods. Concerning whether zoning strategies helps to promote tourism in the region, the least of the respondents in both conservancies (9.5%) and (13.3%) agree while (4.8%) and (7.0%) don't agree with this for Naibung'a and Namunyak respectively.

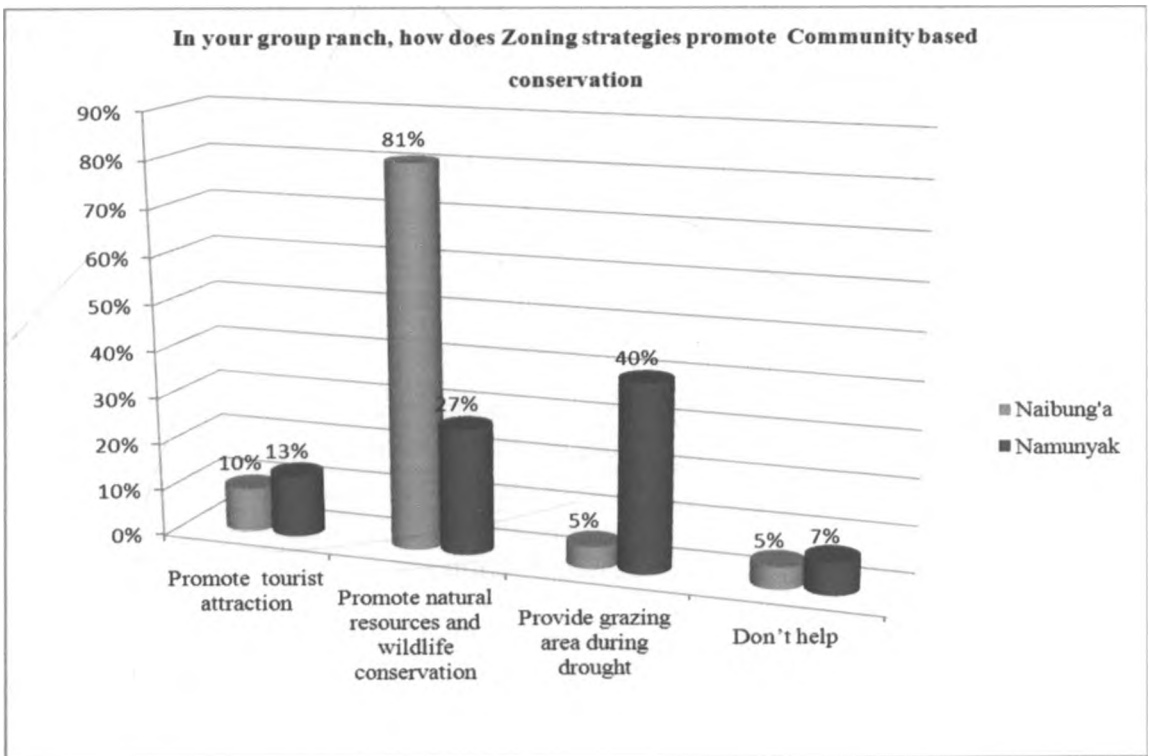


Figure 5.6: Zoning strategies and Community based conservation (CBC)

5.4.2. Community Participation

In Naibung'a all respondents (100%, n=78) and (96.7%, n=29) in Namunyak, agreed that community participation in management of natural resources is necessary if community based conservation, as a model tool for the conservation of biodiversity is to succeed.

Table 5.8: Reasons for community participation in wildlife conservation

Community conservancy	Community involvement and participation in wildlife conservation	Frequency	Valid percent
<i>Naibung'a</i>	For economic diversification	14	38.9
	Wildlife provides income through tourism	3	8.3
	Because more wildlife are found in our group ranches	4	11.1
	To understand more about conservation	1	2.8
	Community owns both livestock and wildlife	3	8.3
	Because communities bear most costs of living with wildlife	11	30.6
	Total	36	100.0
<i>Namunyak</i>	For economic diversification	13	48.1
	Wildlife provides income through tourism	1	3.7
	Because they like with animals	8	29.6
	To understand more about conservation	1	3.7
	For sustainable use of natural resources	2	7.4
	Community owns both livestock and wildlife	1	3.7
	Because communities bear most costs of living with wildlife	1	3.7
	Total	27	100.0

There was unanimity on the need to involve communities in wildlife conservation and management outside protected areas through a collaborative effort with KWS. All respondents in Namunyak (n=78) and (98.7%) stated that the co-operation should start at the community level and extend all the way to the representation at the Board of Trustees. The

majority of the respondents (95%) further reported that community participation is necessary for the success of CBC.

5.4.3. Natural Resource Use And Management Committees

In reporting the necessity of NRM committees in sustainable use of natural resources and community conservation, the majority of Naibung'a households (53.3%) reported that established NRM management committees are very necessary. However, (33.3%) reported that they are somehow necessary and (3.3%) reported that they are not necessary. In Namunyak, a greater majority (62.8%) of the households reported that NRM committees are very necessary, whereas (37.2%) reported that they are somehow necessary and (10%) reported that they are not necessary.

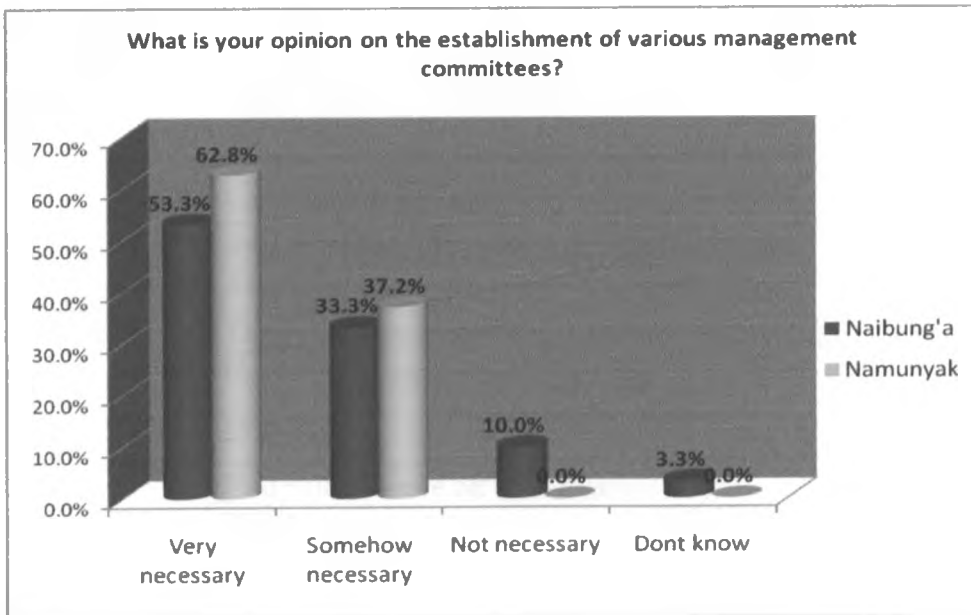


Figure 5.7: Opinion on the establishment of various committees

However, when asked whether capacity building of established management committees is an effective approach to better management of community-based natural resource management, there are differences in respondent's perception in both areas. The majority of the respondents in both areas seemed to agree that reported sharing of knowledge and skills acquired by the committees with the rest of the members is an effective approach (65.8%) and (70.6%) for Naibung'a and Namunyak respectively. The least of the respondents (15.8%) and (11.8%) reported that capacity building helps the NRM committees to understand more on conservation benefits (Table 5.9).

Table 5.9: Capacity building of management committees

Community Conservancy	Capacity building	Frequency	Valid Percent
<i>Naibung'a</i>	They share their knowledge with the community	25	65.8
	Helps them understand their roles	2	5.3
	Understand more on conservation	6	15.8
	Creates employment	1	2.6
	Improved management skill	4	10.5
	Total	38	100.0
<i>Namunyak</i>	They share their knowledge with the community	12	70.6
	Helps them understand their roles	2	11.8
	Don't know	1	5.9
	Understand more on conservation	2	11.8
	Total	17	100.0

5.4.4. Key Incentives for Successful Community Conservation

Respondents were asked to state the most important incentives in order of priority for successful community based conservation in their group ranches. As shown in figure 5.8, there were differences in prioritizing incentives by the respondents in both conservation areas. In Naibung'a, fifty-three percent reported that revenue sharing was the most important incentives for them followed by compensation for losses (47%) due to loss of human life, crop, or property damage by wildlife or livestock predation. The least preferred incentives are provision of bursary for needy children (1%).

In Namunyak, the majority of the respondents preferred compensation for losses (47%) and revenue sharing (23%). The least preferred incentives are provision of employment for locals (3%).

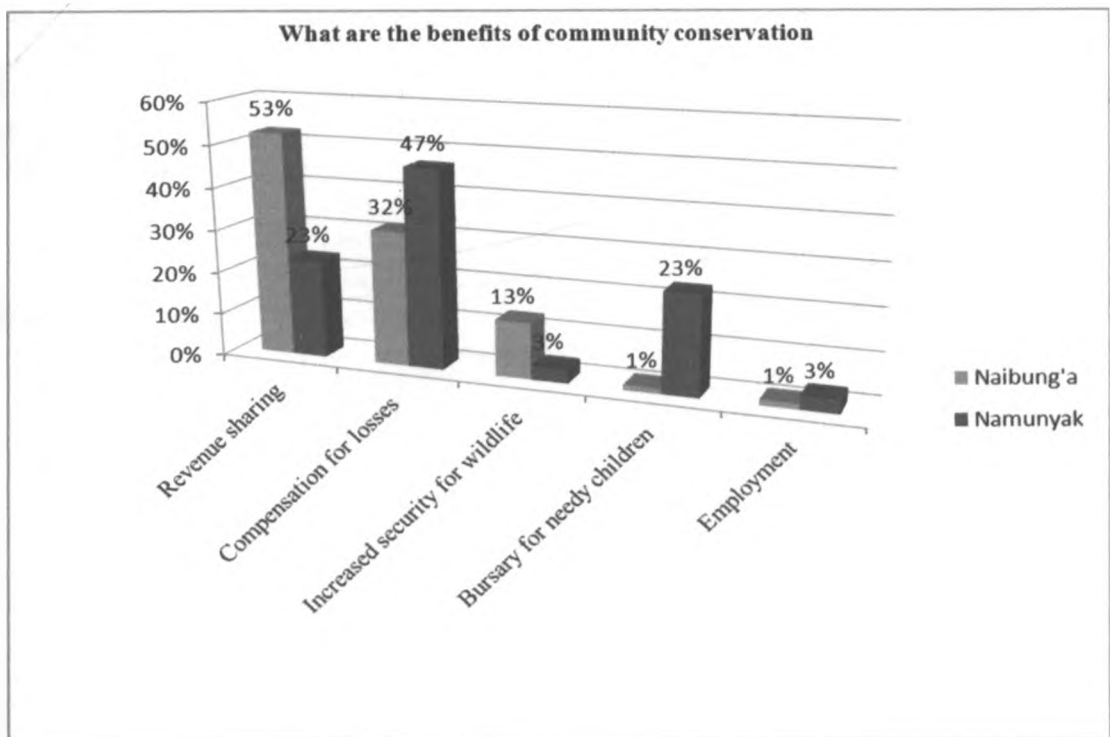


Figure 5.8: Key incentives for successful Community Conservation

5.4.4. Impact Of Community Conservation on Insecurity

In both Naibung'a and Namunyak, 82% of the households reported that CBC has significantly decreased insecurity problems especially due to cattle rustling and banditry in the area; a further (13.3%) and (10.7%) reported that the insecurity problems have increased. Pastoral livelihood will hardly improve in areas where there is armed conflict.

Asset and income diversification and improved access to information and external resources will also help. Improved risk management will enable pastoralists to take action to reduce the chance of losing assets, income or other aspects of well-being Security situation has improved significantly in the area due to the employment of community scouts who work closely with the existing government security machinery

Table 5.10: Impact of CBC on in security

CBC Security level	Impact	Frequency	Valid Percent
<i>Naibung'a</i>	Increased	10	13.3
	Remained the same	3	4.0
	Decreased	62	82.7
	Total	75	100.0
<i>Namunyak</i>	Increased	3	10.7
	Remained the same	2	7.1
	Decreased	23	82.1
	Total	28	100.0

5.5. Threats Facing Natural Resources and Livestock Management

Using focus group discussion, semi-structured, and key informant interviews, the results of study show that natural resources and livestock in Naibung'a and Namunyak Wildlife Conservancies are under threat due to numerous factors. This section discusses the various threats facing natural resources and livestock in these conservancies.

5.5.1. Climate Change

Like other ASALs in Kenya, Naibung'a, and Namunyak Wildlife Conservancies are faced with the threat of climate change. This is a global problem resulting from global warming. Changes in rainfall patterns because of climate change are a serious threat to vegetation within Naibung'a and Namunyak Wildlife Conservancies. Decreased rainfall affects plant regeneration. Climate change is leading to prolonged droughts in the area. These droughts are in turn encouraging the influx of immigrant pastoral communities into the area, which is exerting pressure on the limited vegetation resources as well as natural resource conflicts.

The incidence of vector-borne and zoonotic diseases (VBZD) is difficult to predict and model. Climate change is one of many variables known to affect the rates of these infectious diseases. Climate change may result in changing distribution of VBZD prevalent in Northern Kenya. This could cause formerly prevalent diseases such as malaria and dengue fever to re-emerge, or facilitate the introduction and spread of new disease agents, such as Rift Valley Fever virus (Martens *et al* 1995).

The potential for climate change to impact the range and incidence of VBZD in the Northern Kenya rests with climatic influences on the ecology of insect vectors and animal hosts, and on the life cycles of the disease-causing germs they carry. For instance, as temperature increases, the malaria parasite reproduces at a higher rate, and mosquitoes take

blood meals more frequently, up to a certain ceiling determined by individual species. Some VBZD agents prevalent in Northern Kenya, Rift Valley Fever virus show evidence of seasonality. Current evidence suggests that the range of these diseases could change with a changing climate. Nevertheless, our current understanding of the complex transmission cycles of these diseases, along with incomplete understanding of the ecology of insect vectors and animal hosts, and the lack of long-term historical datasets linking weather with VBZD outcomes, makes projections very difficult for VBZD currently prevalent in Northern Kenya.

5.5.2. Invasive Species

In the recent past, invasive species have spread into many parts of the conservancies. The three invasive species include *Acacia reficiens* and *Opuntia spp.* (which are most widespread), *Datura sp.* and *Propopsis juliflora*. While most of the invasive species supplant the growth of other species, some have negative effect on animal health such as *Datura sp.* and *Prosopsis juliflora*.

The consumption of cactus by sheep and goats will lead to destruction of the gastrointestinal system of the animal. The cactus thorn sticks to the tongue as well as the mucosa of the digestive system (Plate 4b). The effect of this is the destruction of the tongue and the gut such that the animal is unable to eat. At slaughter during postmortem inspection, the stomach and the intestines are condemned leading to an economic loss.

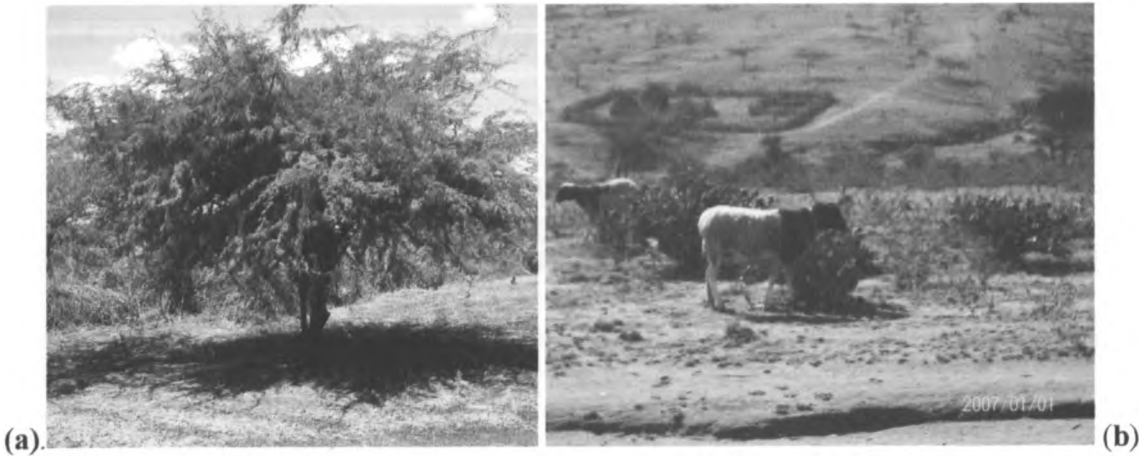


Plate 4: (a) *Prosopis Juliflora* plant in Namunyak (Courtesy of Olima, 2006) and (b): Sheep feeding on *Opuntia spp.* in Naibung'a conservancy

5.5.3. Unsustainable Land Use Systems and Competing Uses

These include overstocking, dry land agriculture, deforestation, unmanaged sand, stone harvesting, and over-exploitation of resources. In the conservancies, there is no land use plan. Competing uses of land such as livestock grazing, conservation, expansion of agriculture, urbanization, and human settlement are a threat to the land resource in the conservancies in the absence of a good land use plan.



Plate 5: Sand harvesting in Eastern Samburu near Namunyak (Picture by Nick Oguge)

5.5.4. Cattle Rustling And Nomadic Transhumance

Due to drought, disease and other factors leading to loss of livestock. Cattle rustling is common in the area. The local culture also contributes to cattle rustling. Conflicts are prevalent in many dryland areas of East Africa where pastoralism is practiced Eriksen and (Lind, 2005). It has been argued that conflicts form part of structural processes to gain control over resources and strengthen livelihoods (Eriksen and Lind 2005). It is also deemed an adaptive strategy to restock after droughts.

Nomadic and transhumant pastoralism are the most dominant and efficient low-cost methods of animal husbandry in arid and semi-arid areas of Africa. Because of the harsh climatic conditions, limited availability of water and pasture, and the reliance on livestock as the sole source of livelihoods support, nomads have developed special cultural and social patterns where natural resources are collectively owned by clans or tribes. In these areas, movements become important adaptive measures used to meet the demands of seasonally available water and pasture (Scoones, 1994).

Disease causing pathogens benefit greatly from dynamic states created by animal movements (Kock *et al.*, 2002) because infected and susceptible animals come into contact as they share common resources, e.g. watering points, salt licks or grazing fields. Livestock markets, on the other hand, aid in the dissemination of diseases such as foot and mouth, bovine tuberculosis and Trypanosmosis because they act as contact nodes between infected and susceptible herds (Fèvre *et al.*, 2006).

5.5.5. Predation By Wildlife

All households reported livestock predation of 100% and 94.8% for Naibung'a and Namunyak respectively. Loss of income per household through livestock predation was estimated in monetary terms for one year.

In Naibung'a, the majority of the households (52%) reported an annual loss of income of between Kshs 1,000 and 10,000 in the year 2008. The smallest segments of the households were those who incurred loss of income less than Kshs 40,000 (2%) and over Kshs.50, 000 (4%). Among households in Namunyak, the majority of the households (23%) reported an annual loss of income of between Kshs 1,000 and 10,000 in the same year. The smallest segments of the households were those who incurred loss of income between Kshs. 30,000-40,000 (7%) and less than Kshs.50, 000 (10%). The figure below shows estimated loss of income for the year 2008 among the households in both community conservancies.

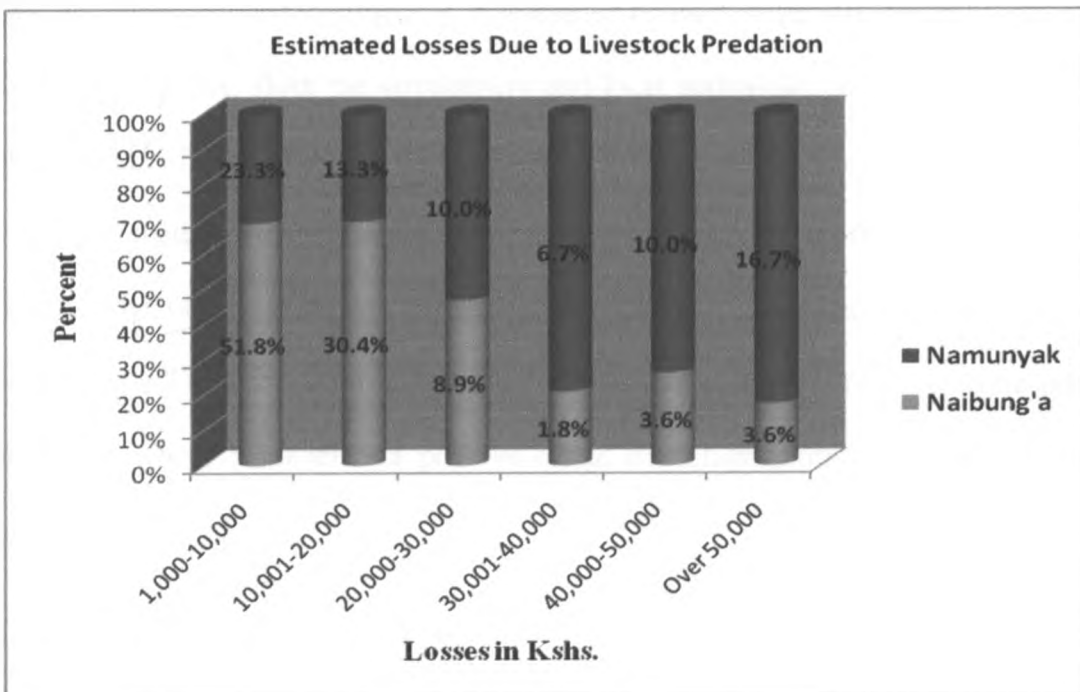


Figure 5.9: Estimated losses due to livestock predation in one year

In Namunyak, the mean average loss of income due to loss of livestock predation is Kshs. 20,696.43 (n=56) with a minimum loss is Kshs. 2,000 and a maximum of Kshs. 30,000. However, respondents from Namunyak seem to have incurred higher losses due to livestock predation with mean average of Kshs. 33,500.00 (n=24). The minimum loss incurred is Kshs. 2,500 and a maximum of Kshs. 1000,000 for the year 2008. Due to mixed production system incorporating livestock production and wildlife conservation, there are cases of predation of livestock by predators such as leopards, lions, and hyenas.

5.5.6. Diseases At The Livestock-Wildlife Interface

In Naibung'a more respondents (41.7%) are aware of disease transmission at the wildlife-livestock interface while in Namunyak small portion of respondents (24%) are aware of the disease transmission at the interface with the majority of the respondents (64%) reported that they are not aware . Livestock infection is worsened by inadequate infrastructure to cope with such disease outbreak. Both the government and local authorities lack adequate capacity to effectively and efficiently respond to livestock diseases outbreak.

Unfortunately, there is no mechanism to compensate pastoralists for the livestock lost to such diseases outbreaks, which heightens human hostility towards wildlife. The reported diseases include Trypanosmosis (*Lodwa*) from buffalo, Heart water (*Poroto*) from primates, Anthrax (*Lokushum*) from anthrax positive cases, Brucellosis(ikibiroto) and Tuberculosis (nkiroget) through milk.

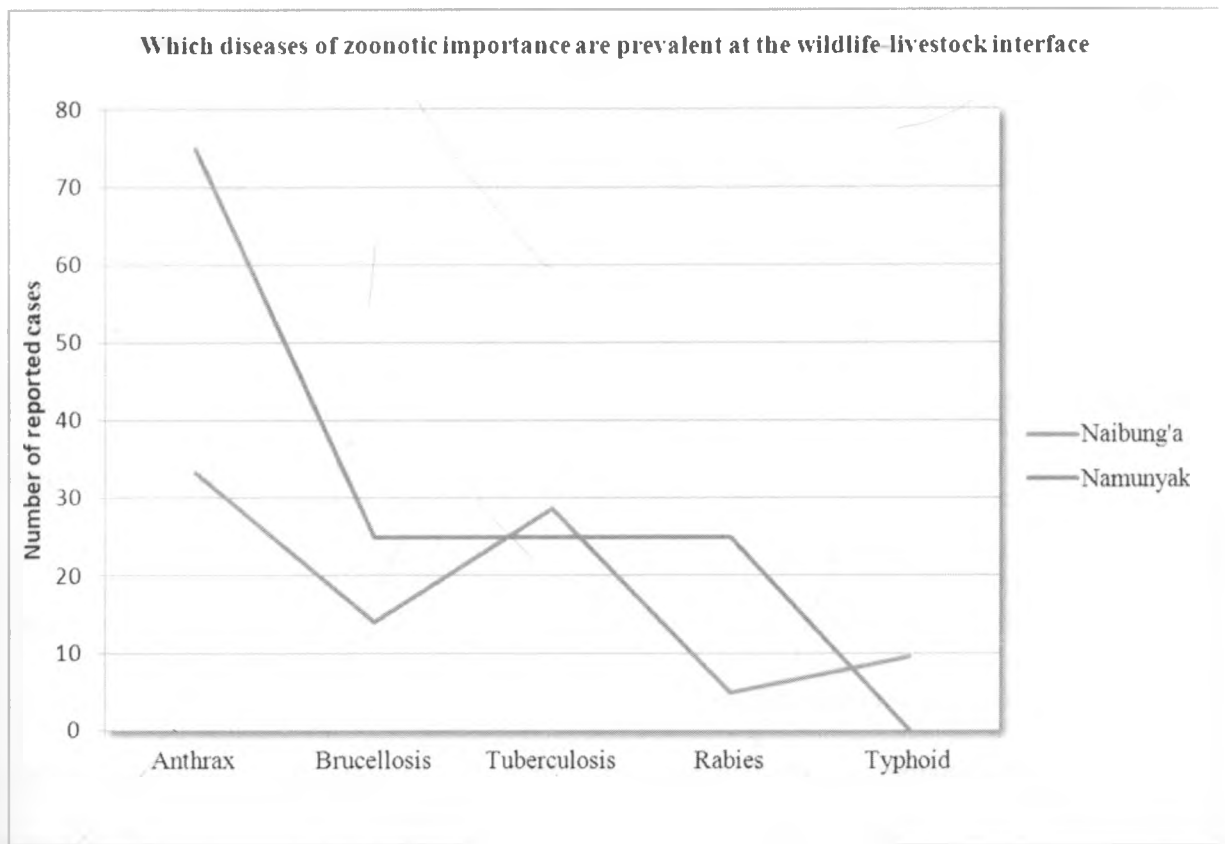


Figure 5.10: Prevalent zoonotic diseases at the wildlife-livestock interface

The least of the respondents in Namunyak community conservancy (27 (23.1%)) were aware of the causal association between zoonotic diseases and the livestock-wildlife interaction, while 86 (61.9%) respondents in Naibung'a community conservancy were aware of it. Some respondents associated these diseases with vectors, feeding and common shared water points or climatic change.

In Naibung'a, the most prevalent zoonotic diseases are Brucellosis and Tuberculosis. They comprised (28.6%) and (33.3%) of the total disease cases respectively. Other recorded disease cases are Rabies (6.0%), Anthrax (21.0%), and Typhoid (*Samonella typhi*) (6.1%). The mean average numbers of people affected by these zoonotic diseases are 22.38 and 47.26 (n=40) for adults and children respectively. This is similar in Namunyak where Brucellosis and Tuberculosis accounts for (25%) of total cases.

5.5.7. Human-Wildlife Conflicts

There are mainly three areas of conflict between humans (especially pastoralists) and wildlife. These are feeding competition, disease control, and predation, Grootenhuis and Olubayo, (1993). As a result, co-existence of livestock and wildlife is threatened by declining profits mainly pushed down by increasing costs arising from the intermingling of wildlife and livestock. The costs of conserving wildlife are insurmountable to communities, they might not conserve even if they wish to.

The burden of wildlife damage falls heavily on pastoralist communities – disrupts other economic activities and increases the opportunity costs of alternative land uses foregone or diminished (Emerton 1999), (Mbogoh *et al.*, 1999). Natural resource use conflicts have increased in Namunyak conservancy mainly because of land use transformation, population growth and increased resource scarcity. Resource use conflicts may result in loss of life and property.

The resource use conflicts have occurred around key natural resources: water, pasture and land for settlement. Demand for the hitherto dwindling water and pasture resources has heightened the resource use conflicts. The conflicts are seasonal in nature and increases during the dry season. The conflicts have pitted communities against each other. Conflicts result in loss of life and property. It is possible to expect natural resource use conflicts to increase in future with increasing resource scarcity.

This study also identified direct and indirect ways in which conflicts influenced the spread of livestock diseases. Human-wildlife conflicts also undermine human welfare, health and safety, and have economic and social costs. Nuisance encounters with small animals, exposure to zoonotic diseases, physical injury or even death caused by large predators' attacks

have high financial costs for individuals and society in the form of medical treatments to cure and prevent infections transmitted from animals.

The most serious human–wildlife conflict (94 per cent) is competition for pasture followed by competition for water (92 per cent). Competition for pasture intensifies during the dry season and the main competitors are elephants and zebras. During the dry season, water scarcity increases resulting in serious human–wildlife conflict. Wildlife such as elephants and baboons have tendency to become violent in the face of water scarcity resulting in destruction of property and life. Grevy zebras contaminate the watering point with their urine, which livestock cannot drink. In most cases, elephants destroy watering point, thus lowering water quality for domestic and livestock uses (Mwele *et al.*, 2006).

5.5.8. Competition for Water and Pasture Resources

Humans and wildlife in the conservancies compete for limited water and pasture resources, especially during dry seasons that results in conflict. Livestock can and do compete with several species of wildlife for forage in community group ranches in Naibung'a and Namunyak, but this may vary according to rainfall. Wildlife appear to avoid heavily grazed areas completely in arid northern Kenya (De Leeuw *et al.*, 2001), but mix more closely with livestock in semi -arid rangelands in southern Kenya. Wildlife probably avoids areas close to settlements because livestock remove most of the forage. Around Samburu pastoral settlements in northern Kenya, Grevy's zebra graze away from the settlements during the day, but move close to them during the night (Williams, 1998).

Samburu build their settlements along riverine areas, within walking distance of streambeds where Samburu dig wells. After livestock are put into their corrals for the night,

zebra come down to the streambeds to drink and leave by the next morning. They may also come close to the settlements at night for better predator protection as well.

5.6. Natural Resource and Livestock Management Interventions

5.6.1. Clear and Effective Zonation

Currently Naibung'a and Namunyak wildlife conservancies have established some form of zonation. However, there are various weaknesses related to the form of zonation that has been done. Boundaries are not clear while the zones are not documented (there is no mapping of zones). Limitations of the zones are not well understood, hence there is abuse of the zoning system. There is no core conservation area. The objectives of the zoning should be clearly defined and the community should be actively involved in the zonation exercise. The boundaries of the zones should be clearly established, communicated to the community and mapped for reference. The rationale for zonation should be clarified to the community.

5.6.2. Water Resources Management

Water is one of the critically threatened resources in the conservancy due to high demand for use, drought, destruction of catchment and pollution among other threats. There are limited water sources in the conservancy yet the demand is high, which is a source of conflicts among the many users. Against a background of numerous threats, there is critical need to manage the water resources properly. Water resources management should involve:

- ⌘ Creation of user awareness on water conservation
- ⌘ Protection of water catchments such as springs from destruction
- ⌘ Proper utilization (sustainable use)

- ⌘ Prevention of water pollution through proper disposal of waste, treatment of effluent before discharge, proper use of chemicals, careful use of land and other potential sources of pollution

5.6.3. Environmental Management

The general environment in the conservancy is also affected by the threat of environmental degradation because of human activities such as overgrazing, charcoal burning, and solid waste and by effect of global environmental problems of climate change. Environmental management in the conservancy should include the following:

- ⌘ Environmental education programmes
- ⌘ Proper disposal of waste
- ⌘ Environmental Impact Assessment for all development projects in the conservancy
- ⌘ Control of overgrazing
- ⌘ Conservation of water

5.6.4. Livestock Management

The economy of the communities based in Samburu and is mainly livestock based. Livestock has a lot of influence on all land use activities in the area, including natural resources use and management. Therefore, any development initiative in the area should address the livestock production issues. Being an integral component of land use, livestock production should be addressed in this natural resource management plan. Naibung'a and Namunyak Wildlife Conservancies can participate in improved livestock management in the following ways:

- ⌘ Strengthening the grazing committees through awareness, logistical and other support, leadership training and other ways
- ⌘ Ensuring adherence to the zoning plan

- ⌘ Educating the local community on benefits of correct stocking, proper land use, sustainable natural resource management, need to discard retrogressive cultural practices such as cattle rustling
- ⌘ Initiating high quality forage reseeding and other grazing land rehabilitation programmes
- ⌘ Expansion of water sources for livestock use

5.6.5. Development of Support Infrastructure

Support infrastructure including good access roads, communication equipment, well-equipped security system, information resource centre, vehicles and other basic support infrastructure are key for the implementation of natural resource management programs. The conservancy needs to mobilize more resources to further develop support infrastructure to create an enabling environment for the implementation of natural resource management programs. This development should include:

- ⌘ Improvement of existing roads and creation of new ones as per approved management plan and after environmental impact assessment
- ⌘ Better equipment of conservancy security by provision of adequate and latest equipment , especially for security surveillance

5.7. People, Livestock, And Wildlife: Existing Best Management Practices

Recent re-evaluations have recognized that livestock production is not the sole value of pastoral lands; rather, the focus might be more appropriately placed on improving pastoral livelihoods and maintaining ecosystem health in these vast lands (De Haan, 1999); Niamir- (Fuller, 1999). A consensus is emerging that pastoral lifestyles are more compatible with maintenance of rangeland integrity than are other types of land use. Pastoral systems in Ewaso Nyiro ecosystem are rapidly evolving, driven by a combination of policy changes, drought, migration and human population pressure.

In this study, the trade-offs assessed are the existing community best management practices that promote the use of pastureland for livestock production in co-existence with high diversity and biomass of wildlife through development of eco-tourism enterprises that contributes towards livelihoods. They are also new participatory policies and laws that support community-based conservation, devolve wildlife management, and enhance benefits to local communities. These trade-offs includes;

- ⌘ Secure resource rights and strong local institutions
- ⌘ Revenue sharing and incentives
- ⌘ Strengthening resource access and tenure rights
- ⌘ Community based ecotourism(CBET)
- ⌘ Trainings and awareness creation (community exposure)
- ⌘ Participatory conservation methods
- ⌘ Conservation-friendly culture and spiritual values:
- ⌘ Rich resource endowment
- ⌘ Improved security
- ⌘ Collaboration and strong partnerships ↕

8 Traditional indigenous and conservation knowledge

5.7.1. Secure Resource Rights and Strong Local Institutions

Secure rights to land and natural resources are central for generating livelihood benefits which in turn provide the necessary incentives for communities to engage in CBC and sustain initiatives once an external project ends. They are important livelihood benefits in themselves, and are also important for communities to take a long term view and invest in developing NRM systems. Strong and democratic local institutions are needed to promote equitable benefit-sharing and downward accountability (often accountability remains to external NR agencies).

Where community institutions for resource management have been weakened, investing in strengthening local institutions is likely to be more effective in delivering conservation outcomes in the long term, than the imposition of top-down regimes which further undermine local institutions and therefore increase reliance on external institutions and funding. The study findings shows that strengthening existing local institutions is likely to be more effective than creating new ones, while building on traditional institutions, knowledge and practices may be necessary to secure active community participation.

The conservancies have established various committees that control and coordinate use and protection of resources within the conservancy. These include the grazing committee that coordinates grazing patterns and use of pasture resources; the environmental and forest committees that coordinate environmental protection, the water committee that controls use and protection of water resources and the morans (security) committee that oversees security in the conservancy (Figure 5.7).

The conservancies have attempted to provide opportunities to both male and female gender to participate in the general decision making regarding the operations of the conservancies. By having the female gender in the conservancy board of trustees, this is a good starting point for mainstreaming of gender in development. The local community is quite enthusiastic about conservation of natural resources and has provided a lot of support to the conservancy. This provides good incentive for community participation in natural resources management.

Young people possess many skills and resources that can be utilized in areas of development, democracy and political participation. Mostly, youths in pastoralist's communities are denied space in political leadership supported by bias cultural beliefs and practices thus their potential is not fully realized. The elders participate in exclusion rendering the potentially useful youth skills and resources redundant but in Naibung'a and Namunyak conservancies, youth should have been involved in the creation of instruments that form part of the regulatory framework for the natural resources, drawing upon their enthusiasm to actively participate in managerial issues.

5.7.2. Revenue Sharing And Incentives

The former KWS Director Richard Leakey announced a policy of segregation where all parks would be fenced off to protect local people from wildlife and wildlife from poachers. Western (1994). The policy was later withdrawn which most likely would have created a biological disaster, in favour of local participation and incentives. It was later announced that approximately 25% of KWS funds should go to the neighbourhood rural communities in terms of schools, dispensaries, and water supplies.

Benefits from wildlife varied greatly with majority of respondents reporting benefits from conservancies. In Namunyak and Naibung'a (50.5%) of the respondents reported to receive benefits in form of school bursaries and support for some development projects (Figure 5.8).

The conservancies have a strong component of community development and contribute significantly to community welfare and development. Sharing of benefits and contribution to community welfare in areas such as employment, support to education and security enhancement have significantly motivated people to participate more in conservation of the environment and natural resources management. Secure legal rights to benefit from natural resources gives communities a key incentive to participate in and sustain NRM. This provides strong incentives for community participation in wildlife management through full transfer of rights and returns to communities.



Plate 6: A local community clinic (left) built by Olentile sanctuary and Right: Trained community health workers taking bicycles home bought by the sanctuary (Picture by Olesarioyo).

5.7.3. Strengthening Resource Access And Tenure Rights

Strengthening resource access and tenure rights are critical factors for effective community conservation: the recognition of *community rights* to natural resources; and *genuine participation* of local people in the analysis, design and implementation of initiatives. Legal frameworks should grant secure resource access and tenure rights to pastoralists. This is essential for the poor to take a long term view (Pimbert, 2003a).

While close dependence on biodiversity brings a theoretically strong incentive to conserve it, weak access and tenure rights of many poor people mean there is a strong potential for over-exploitation, Roe and Elliot (2006). Much research and experience has stressed that strengthening property rights is essential for effective biodiversity conservation. MA (2005b); WRI *et al.* (2005). Where local communities have been granted secure use rights over neighbouring forests, for example, governments have witnessed clear reversals in forest degradation and biodiversity decline (Pimbert, 2003a).

Based on a global review of community forest management (Carter and Gronow, 2005) found that the most significant gains to date probably lie in the South, “wherever local people have begun to enjoy real partnerships in forest management, based on recognised rights of use and access”. Critically, in many countries, communities that enter into forest management partnerships do so in the knowledge that their rights of access to the resource, and the benefits that may accrue from the time invested in management, are secured by legislation (Carter and Gronow, 2005). For some, secure resource rights are more important than monetary income to reduce poverty and gain a decent livelihood (Farvar, 2006).

It may be difficult to gain secure community resource rights, in which case building local institutions can provide a starting point to enhance local resource control and capacity to negotiate for recognition of rights. Local organisations set up by poor people, community

groups, farmers' associations, etc., provide a vital means by which poor, marginalised groups can have greater influence on politics and decision-making locally and nationally, Bigg, (2006).

Over the last few years, the Kenyan government has put in place good policies and legislations that provide good framework for sustainable use and management of the environment and natural resources (Oguge, 2005). Although some of the polices are at the draft stage, this paradigm shift towards better polices and laws that support sustainable natural resources management and provide better opportunities for local communities to actively participate in managing their resources provide a better future for good resource management. Some of these policies are the draft land policy, the draft wildlife policy and the environmental policy whose preparation is now starting. Some of the good legislations that have recently been enacted include the Environmental Management and Coordination Act (EMCA), the Water Act, Kenya National Land Policy and the Forests Act among others.

The majority of respondents (98.4%) reported that zoning strategies introduced in the group ranches helps to promote sustainable use of natural resources and wildlife conservation (Figure 5.6). The land use zoning primarily designated the group ranches into zones for conservation, livestock grazing and settlement areas. It also strengthened local institutions by setting up of management committees to which there are three: (i) Group Ranch, (ii) Enterprises, Tourism and NRM, and (iii) Grazing, Bee Keeping and Settlement committees.

The conservancies have established a grazing system that has helped to efficiently utilize the pasture and water resources in the conservancy. Grazing management has promoted livestock production and helped alleviate impacts of droughts.

A review of effectiveness of the NRM on ecosystem health has since been undertaken for the area. The Naibung'a NRM was developed in 1999 and between then and 2004, a

significant increase in the normalized difference vegetation index (NDVI) in conservation areas of Kijabe and Koiya group ranches has occurred. This indicates an increase in vegetation biomass and thus would suggest an improvement in ecosystem health in the respective conservation areas (Oguge, 2005). Conversely, the settlement and grazing areas show significant decrease to no change across most of the landscape. Vegetation change is the best indicator in ecosystems, and given a significant increase in plant cover over a 5-year period, it is plausible to suggest modest success in the role of NRM in reversing the trends in ecosystem degradation.

Satellite imagery analyses were corroborated by vegetation data from ground truthing studies (Plate 1). Such vegetation data showed high species richness and diversity in the conservation area of Kijabe ranch indicating that the NRM, to a reasonable extent, has led to the slowing of ecosystem degradation that may now be at an early stage of recovery. That an important forage species *Themeda triandra* was observed only in Kijabe conservation area (which has also indicated increased cover) would suggest that the NRM program's effect on biodiversity conservation here is positive. It can be concluded that implementation of the NRM in Naibung'a is good practice that encouraged the other six group ranches in Naibung'a and two in Namunyak to embrace conservation and natural resource use.

5.7.4. Community Based Ecotourism (CBE)

Ecotourism (ET) is a form of sustainable tourism and Community-based Ecotourism (CBET) is ecotourism where local communities are the main actors. Community-based ecotourism is one form of community-based conservation (CBC) that promotes species conservation and sustainable economic growth. Ecotourism can generate support for conservation among communities as long as they see some benefit (or maintain a hope of doing so), and if it does

not threaten or interfere with their main sources of livelihood, Walpole and Goodwin (2001). The idea of ecotourism, a form of nature-based tourism, contributing both towards socioeconomic and environmental benefits, burst into the scientific and later public consciousness in the 1990s (Wearing and Neil, 1999). It can now be considered one of conservation biology's hottest 'buzzwords' (Aylward *et al.*, 1996).

According to Honey (1999), CBET should include seven key aspects: 1- Respect local culture, 2- Involve travel to natural areas, 3- Minimize impact, 4- Build environmental awareness, 5- Provide direct financial benefits for conservation, 6- Provide financial benefits and empowerment for local people and 7- Support human rights and democratic movements as defined by Forgie *et al.* (2001). Concerning whether community benefits from tourists coming to either Namunyak or Naibung'a, the majority of the households (60.4%) said that tourists coming to the Sanctuary at Olentile, Starbed and Sarara eco-lodges help pastoralists in a number of ways (Table 5.5). Presently, there are a tented camps and eco-lodges within the conservancies that generate revenue through tourism. The growth of tourism and generation of more income provides an opportunity for allocation of more resources for natural resources management. The local communities here have also initiated cultural tourism thereby raising income from their cultural practices (Plate 7). Eco-tourism is also being practiced and is a source of income for the community. Cultural and eco-tourism at Namunyak and Naibung'a have had no (negative) ecological footprint.



Plate 7: Right: Morans and ladies dancing to entertain tourist at Olentile sanctuary (right) and Left: some of the beaded items made by women for sale to the tourists (Picture by Olesarioyo).

To cope up with the effect of climate change and retreating pastoralism, there is need for diversification of livelihoods and alternative incomes such as beading, processing and selling hides and skins, running butcheries and kiosks, and trading in livestock. Limited access to financial capital and inadequate business management skills are major drawbacks, either to start up a business or to move from a micro enterprise to larger enterprises.

5.7.5. Trainings and Awareness Creation (Community Exposure)

Training to develop skills for investment is a pivotal point for the success of any intervention for alternative income generation. Destitute pastoralists often lack both the basic skills needed to develop a business plan, do the accounting, or manage a small or medium enterprise and the knowledge of how to process pastoral products. Although basic and secondary education enhances both the ability of pastoralist to fund a small or medium enterprise and the chances of pastoralists to get employed in high paid jobs it does not necessarily have a positive effect on herd management, because it withdraws children from investigation and learning about herding. A greater majority (94.5%) of the households agreed that capacity building of

established management committees is an effective approach to better management of community-based natural resource management (Table 5.9).

The conservancies have made considerable achievement in training and creating awareness on both natural resource committees and its members through various forums such as formal and informal meetings, seminars/workshops, and exposure trips. Awareness creation has been instrumental in participation of the local community in various programmes.

5.7.6. Participatory Conservation Methods

Most of the strategies employed by the conservancies are quite participatory, giving members of the local community an opportunity to take part in virtually all decisions regarding the management and development of the conservancy. Participation seems intuitively simple, but remains poorly defined, meaning different things to different people. We define participation as “a process during which individuals, groups and organizations become actively involved in a project (Wilcox, 2003). By specifying that involvement must be active, this definition highlights how empowerment is fundamental to participation.

Against this background, there was unanimity on the need to involve communities in wildlife conservation and management outside protected areas. Over ninety-five percent of community respondents stated that it was necessary to be involved in wildlife conservation through a collaborative effort with KWS (Figure 5.8). Households stated that the co-operation should start at the village community level and extend all the way to the representation at the Board of Trustees. Communities should be recognized as stakeholders and equal partners in conservation.

Local involvement is either a scheme of revenue sharing with local communities, decision power about the project being given to local communities or a substantial amount of

the labour force drawn from local communities. Most of the strategies employed by the conservancies are quite participatory, giving members of the local community an opportunity to take part in virtually all decisions regarding the management and development of the conservancy. CBC efforts involve bottom-up (or grass roots) activities that bring individuals and organizations together to work towards achieving desired environmental goals.

5.7.7. Conservation-Friendly Culture and Spiritual Values:

The identity of human cultures around the world is attached to varying degrees to wild species. Dryland peoples identify themselves with the use of their surrounding ecosystem and create their own unique ecosystem-inspired culture. Drylands have high cultural diversity, in keeping with the ecosystem diversity along the aridity gradient. One expression of this is that 24% of global languages are associated with the drylands' grassland, savannah, and shrubland biomes. Ecosystem functions and diversity generate cultural identity and diversity that in turn conserve ecosystem integrity and diversity. A negative feedback loop is therefore expected between land degradation and cultural degradation in drylands. Among the Samburu, clans associate with different wild species, thus of important culturally. Whatever the case, cultural diversity is closely linked to wild species.

The Maasai and Samburu communities have a culture that is friendly to conservation in many ways. The community has co-existed with wildlife and other natural resources over many years. This ecological-cultural harmony is largely a function of the community cultural beliefs and practices. For instance, the community members only collect dead wood for firewood. The nomadic way of life also gave room to rejuvenation of degraded and overgrazed lands and is a precursor to the modern grazing pattern in the conservancy. Certain taboos and myths also prohibited the destruction of natural resources. This eco-friendly

culture provides an opportunity for preservation and integration the cultural practices in improvement of natural resources management.

Against this background, the majority of the respondents (99%) reported that there has been change of attitude towards game meat (Table 5.7). Similarly, (81.4%) of the respondents reported that cultural practices that decimate wildlife numbers are no longer in practice.

5.7.8. Rich Resource Endowment

The Ewaso Nyiro Basin is also rich in large mammal species and biomass. The region supports populations of five species of large carnivore: lions (*Panthera leo*), leopards (*Panthera pardus*), cheetahs (*Acinonyx jubatus*), spotted hyaenas (*Crocuta crocuta*) and striped hyaenas (*Hyaena hyaena*). African wild dogs (*Lycaon pictus*) that had been locally extinct have now recolonised the area with the species' fastest growing population in Africa. In addition, the area supports the fastest growing elephant (*Loxodonta africana*) population in Kenya, and the largest sub-population of the endangered Grevy's zebra (*Equus grevyi*) in the wild. Other unique species includes the reticulated giraffe and Somali ostrich.

At over 30,000 km² area, Ewaso Nyiro Basin is larger than all protected areas in Kenya. It has second highest wildlife biomass after the Maasai Mara and a high diversity of large mammals. Ewaso Nyiro Basin is home to some of Kenya's unique mammal, bird and reptilian species, which are adapted to the arid north. This dry country ecosystem is prone to large variations in animal populations as they move in search of water and pasture. During periods of high rainfall, many ungulates disperse, but in the dry season the animals show a preference for the protected areas and riverine ecosystems.

The conservancies have expansive land that allows a mixed production system of livestock production, wildlife protection, and natural resources. Rights and benefits come with responsibility. Responsibilities that communities may shoulder with benefits include monitoring, policing, and ensuring security for wildlife and permitting wildlife access to land for utilization of resources therein. There were variations in willingness to take up responsibilities in the study areas. By use of limited resources, Naibung'a and Namunyak Community Conservancies have been monitoring wildlife within the conservancy. This has been instrumental in wildlife protection. Ewaso Nyiro ecosystem is home for some of the endangered/threatened wildlife species. These include; The African wild dog, the grevy zebra and lesser kudu (Plate 8).

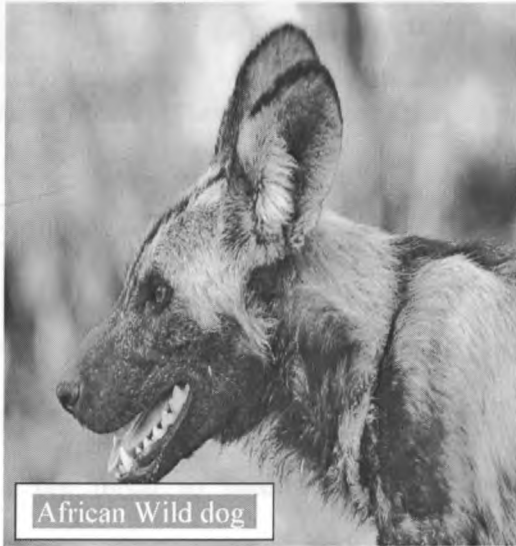


Plate 8: Some of the endangered wildlife species found in community conservancies (Picture by Olesarioyo)

Naibung'a and Namunyak are important elephant habitats and corridor between the Mathews Range and Laikipia. (Plate 9). Naibung'a and Namunyak Community Conservancies are well endowed with abundant natural resources. There are beautiful mountains, plains, rocky

outcrops, dry river valleys, plenty of wildlife, forests, and springs among others. The existence of these resources affords the conservancy an opportunity to conserve and manage them for immediate and future benefits.

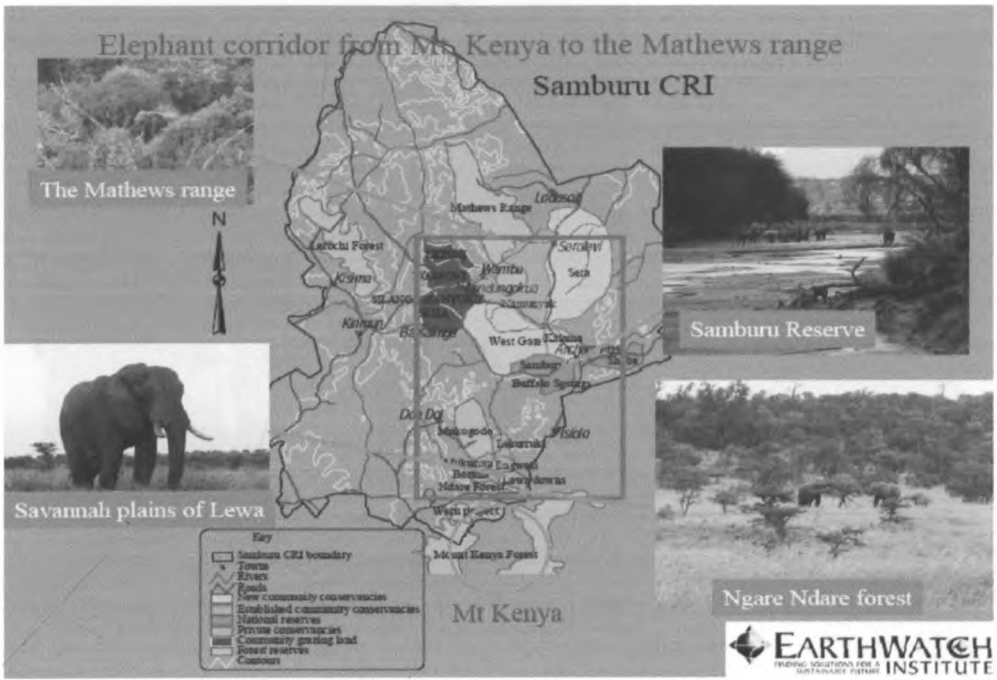


Plate 9: Elephant corridor from Mt. Kenya to Mathew Ranges (adapted from Earth Watch Institute)

5.7.9. Improved Security

In recent years, security has been improved tremendously in the area, thanks to collective effort by the government, Kenya Wildlife Service (KWS), the conservancy, and the local community. Previously, insecurity was a big threat to natural resources management, especially to wildlife. Therefore, improved security provides good opportunity and a conducive environment for improved natural resources management. In Naibung'a and Namunyak, 82.9% of the households reported that CBC has significantly decreased insecurity problems especially due to cattle rustling and banditry in the area (Table 5.10).



Plate 10: Community scouts during training in the Sanctuary at Olentile

5.7.10. Collaboration and Strong Partnerships

Pimbert (2003a) pointed out that devolution of conservation to local communities does not mean that state agencies and other external institutions have no role. A central challenge will be to find ways of allocating limited government resources so as to obtain widespread replication of community initiatives. External agencies need to understand the dynamic complexities of local ecologies; promote wider access to biological information and funds; honour local intellectual property rights; and design technologies, policies, markets and other systems on the basis of local knowledge, needs and aspirations. This calls for new partnerships and forms of democratic deliberation between the state, rural people and the

organisations representing them and new institutional linkages and processes (e.g. communication networks, participatory research).

Naibung'a and Namunyak Community Conservancies have established collaborations and strong working partnerships with various governmental and non-governmental institutions in various programmes and projects. These partnerships have enabled the stakeholders to combine their resources to ensure the development of these programmes. Some of the partners include AU-IBAR, IUCN, AWF, ACC, NRT, KWS, GoK and ALRMP among others. This collaboration and partnership is an incentive towards improved natural resources management.

The conservancy has been getting continued good logistic and financial support from partners such as Lewa Wildlife Conservancy, Northern Rangeland Trust (NRT), the GoK and international development partners such as the St. Pittsburg Zoo. The continued support from these friends and partners provides an opportunity for the conservancy to manage its natural resources better. There was unanimous agreement across the participants that there is need to develop partnership based on three objectives; Development of partnership with stakeholders to overcome the human wildlife conflict; creation of incentives for these stakeholders and protection of people from wildlife damage.

5.7.11. Traditional Indigenous Knowledge

Rural communities are often rich with local knowledge and a strong appreciation of their natural and cultural heritage. Unlike local communities, the private sector may have little incentive for, or knowledge of, sound biodiversity management. As well as distinguishing between rights and interests, rights-holders in biodiversity decision-making should be identified on the basis of their ability to deliver social justice, ecological sustainability and

democratic accountability in the governance of biodiversity. Pimbert 2(003). CBNRM concept is based on communities playing a cardinal role in identifying, utilizing, managing and preserving the natural resources in their domain. It also has to do with setting priorities in terms of development, making choices about technology application, participation, and implementation of management and conservation/ utilization practices.

Community interest in their property is a critical issue in managing and sustaining natural resources, which is consolidated within indigenous knowledge of utilization and conservation. Furthermore, people and activities oriented within a geographical region tend to, share homogeneous characteristics including environmental and traditional knowledge and industry (Baines and Hviding, 1992).

5.7.12. Ethnoveterinary Practices at The Livestock-Wildlife Interface

Availability of veterinary services is a major constraint in the arid areas of Kenya. The government resources to run veterinary practices do not meet the rising costs of within the veterinary sector. The pastoral communities have traditionally relied on whole of indigenous practices to keep their livestock healthy, and treat them when they are sick and they have wide indigenous veterinary knowledge (ITDG/IIRR, 1996).

Mathias and McCorkle (1989) define ethnoveterinary medicine as dealing with the folk beliefs, knowledge, skills, methods and practices pertaining to the health care of animals. (McCorkle, 1996) gives a description of ethnoveterinary medicinal research as the holistic interdisciplinary study of the local knowledge and the socio-cultural structures and environment associated with animal health care and husbandry.

In ethnoveterinary, medicine diseases are diagnosed by palpating looking and smelling (Bizimana, 1994). Some ethno-diagnostic methods are useful and have found their way into

orthodox veterinary medicine. surra (camel trypanosomiasis) is diagnosed by mixing the urine of the sick animal with mud and assessing the dried mud (Kohler-Rollefson, 1996). This is supported by Bizimana, (1994) who also indicated that diagnosis by smelling is useful in the case of trypanosomiasis in camels.

As in ethnoveterinary system globally, (McCorkle, 1986), pastoralist classify most diseases according to their prominent clinical signs. Such examples are seen with Samburu herders who call Nairobi Sheep Disease (NSD) *nadomanyita* referring to red intestines due to bloody diarrhoea, which is the principal, clinical sign of the disease (Haffernan, Haffernan and Stem, 1996). We examined Indigenous Knowledge (IK) on ethnoveterinary medicine in treatment and management of diseases at the livestock-wildlife interface as outlined below.

Anthrax (*Lokuchum*).

Signs

- High fever
- Animal collapses and dies quickly. Animals are usually found dead.
- Affected animals often have good body condition

After death

- Carcass is stiff and bloated
- Bleeding from ears, mouth, nose, anus and vagina
- Blood is dark and does not clot

Prevention

- Burn the carcass or bury it
- Vaccination
- Fence off the area where the animals has died

Treatment

- Take 6 cm long root of *sokotei* (*Salvadora persica*), and the same weight of *sokotei* leaves. Pound the roots and leaves, and boil for 30 minutes in the 10 litres of water. Give the mixture to the animal instead of it is regular drinking water until the animal has recovered.

Brucellosis (Ikiboroto)

Signs

- Cow loses it is calf during the second half of the pregnancy
- Afterbirth does not come out
- Swelling and hardening of testes of bulls and rams

After death

- Carcass is stiff and bloated
- Bleeding from ears, mouth, nose, anus and vagina
- Blood is dark and does not clot

Prevention

- Boil all drinking milk
- Vaccination
- Cook blood before consumption
- Protect your hand with a plastic bag when removing the afterbirth from the animal that has aborted. Make sure blood and other fluids do not touch your skin.

Treatment

- Crush a piece of *sokotei* (*Salvadora persica*) root. And tha is two fingers long. Boil for 1 hour in the 5 litres of water. Use 2 litres for cows and 1 litre for sheep and goats.

Rabies (*enkeya oldian, nkwang*)

Signs in dogs

- The dog eats unusual things, such as wood, fence, its own faeces or raw vegetables
- aggression
- Very high body temperature
- Open mouth drooling
- Tail between the legs

Signs in cattle and other animals

- Bellowing and kicking violently as if on heat
- Biting without provocation
- Paralysed tail and swaying of hind quarters
- Frequent urination

Prevention

- Avoid contact with aggressive dogs
- Vaccinate dogs regularly
- Keep stray dogs and jackals away from livestock

Treatment

- If an animal shows signs of rabies kill it immediately. Do not use the meat for any purpose.
- Burn the carcass or bury it in a deep pit where it cannot be dug by dogs or hyenas.

Tuberculosis (*nkiroget*).

Signs

- Animals are weak and have poor body condition
- Sporadic dry coughs
- Difficulty in breathing
- Some lymph nodes may be swollen

Prevention

- Isolate sick animals
- Do not buy or sell animals that you think may have tuberculosis
- Sick people should not handle animals

Treatment

- No local treatment recommended

Discussion

Anthrax in wildlife is reported as both sporadic cases and major epidemics. Links between disease in wildlife and domestic species unclear. Central to the reduction in livestock losses and human exposures during anthrax or rabies outbreaks in wildlife, are large-scale public awareness limited and frequently contentious or unpopular. Where an alien disease has become established in a free-ranging wildlife population, the situation is serious, control options are campaigns, and mass vaccination of domestic animals.

Most rabies cases in Naibung'a and Namunyak have been reported in domestic dogs and cattle. Mass vaccination of foxes, wild dogs and other Sylvatic reservoirs against rabies using oral bait techniques has been carried over the years by the Laikipia Predator Project.

Mycobacterium bovis, the cause of zoonotic tuberculosis, is mainly transmitted to humans via the consumption of raw and infected animal products. The possibility of aerial transmission should not be ignored, however, especially in situations where livestock and people share small and enclosed dwellings. In Africa, the consumption of raw milk and raw meat, and the increase in bushmeat consumption as a cheap source of proteins, are some of the principal routes for human contaminations with bovine tuberculosis, (Erik *et al.*, 2005). The burden and impact of zoonotic tuberculosis and brucellosis on human health, and the contribution such diseases make to the burden of poverty, in terms of both economic and social losses, clearly need to be documented more precisely.

Once introduced into the wildlife-livestock interface, Bovine tuberculosis cannot be eradicated by traditional control programmes (Darbyshire, 1996). Due to the lack of an effective vaccine at present, it is almost impossible for affected African countries to prevent further geographic spread and additional spill over to other species.

As eradication efforts continue to decrease the prevalence of brucellosis in domestic animal populations, the presence of the disease in wildlife and strategies to control or eliminate it from wildlife populations will likely gain importance.

5.8. Conclusion

The study findings shows that trade-offs cannot be avoided. In this study, the trade-offs assessed are the existing community best management practices that promote the use of pastureland for livestock production in co-existence with high diversity and biomass of wildlife through development of eco-tourism enterprises that contributes towards livelihoods. These trade-offs includes; secure resource rights and strong local institutions, revenue sharing and incentives, strengthening resource access and tenure rights, conservation-friendly culture and spiritual values and improved security.

Integrating ethnoveterinary and orthodox medicine is an important approach to achieving a sustainable animal health delivery system in the pastoral areas of Kenya. The Maasai and Samburu pastoralists have their own confidently used traditional remedies for most tick borne and bacterial diseases.

5.9. Recommendations and Further Research

For effective removal, mitigation and management of threats, climate change and conflicts facing natural resources, and to ensure sustainable use and management of marginal lands resources in Naibung'a and Namunyak wildlife conservancies, this thesis outline the following recommendations.

- There is need to build capacity among members of the conservancy on sustainable use and management of their natural resources.
- Establish a clearly defined zoning plan, strengthen and expand the wildlife management programmes in the conservancy.
- There is need for change of centralized support with greater flexibility and opportunities for innovation with emphasis on the resource managers
- Further research is also needed to evaluate the costs and benefits of conservation to communities, and the extent to which local conservation efforts benefit wider society (e.g. quantity of water provided), to strengthen arguments for community payments for environmental services.
- To improve the delivery of animal health services in the rangelands, the government needs to consider increasing public expenditure for veterinary services in these areas and to devolve some services from the central government to private, public, and community sectors. Community-based animal health workers can provide low-cost services to pastoralists in remote areas

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7.0. Appendixes

Appendix 7.1: Questionnaire

Biodata

1. Name of Head of Household
 - a. Boma Name..... GPS location Northing.....
Easting
2. Sex: 1=Male 2=Female
3. Group ranch Name.....
4. Division
5. District
6. Name of community conservancy
7. Age: 1=18-24 yrs 2=25-34 yrs 3=35-44 yrs 4=>45 yrs
8. How many years have you been living in this village
1= 1-5 years 2= 6-10 years 3= 11-20 years 4= More than 20 years
9. How many dependents do you have?
[] Wives [] sons [] daughters [] Male relatives [] Female relatives
10. Last/highest level of schooling completed by respondent.
1= No schooling 2= Some Primary 3= Finished Primary 4= Some
Secondary 5=Finished secondary 6= College/University

Part 1: Community Natural Resource Management

1. Is there a need to **involve** communities in wildlife conservation and management outside protected areas (Pas)?

1= Yes 2= No 3= Don't know

Explain.....At what level should the community be involved in wildlife conservation and management outside protected areas (Pas)?

1= Village level 2= Community level 3= Board of trustees level

4=others (specify).....

Does **involvement** and **participation** of the community in wildlife conservation and management outside protected areas (Pas) contributes to successful management of community conservancy?

1= Yes 2= No 3= Don't know

Explain.....What are the good things of setting up a community conservancy? 1=Provide Water 2=Bursaries 3=Security 4=Control Harmful Animals 5= Provide Employment 6= Revenue Sharing 7= Development Projects e.g. Schools 8=Others.....

2. What is your opinion on the establishment of various management committees?

1= Very Necessary 2= Somehow Necessary 3=Not Necessary 4=Don't Know

Explain.....

3. Do you think stakeholder/partner training assists in imparting knowledge and skills to these management committees?

1= Yes 2=No 3= Don't know

Explain.....

Have you heard about Revenue sharing around the Community conservancies?

1=Yes 2=No

4. Have you benefitted from revenue sharing? 1=Yes 2=No

If Yes, How?.....

If No, Why

Not?.....

Part 2. Pastoralist land tenure and land use

5. What form of land tenure system practiced in your area? 1= Titled individual land tenure 2= Titled community Group ranches 3= Private Ranches 4= Leased 5= others (please specify).....

6. How does setting up of the community conservancy affects livestock grazing? Explain.....

7. What are the zoning strategies practiced in your area that promote wildlife conservation? Explain

8. In your group ranch, how do these zoning strategies affect community conservation? Explain

9. What are the year (s) that drought has occurred in your group ranch?
1= 2007 2= 2006 3= 2005, 4= 2004 5= 2003,
6= 2002, 7= 2001, 8= 2000

10. Where do you graze your livestock during the dry season?
Name of place

11. Is this place outside the community conservancy? 1= Yes 2= No

12. Where were you grazing in the last dry season?

13. Are you still grazing there? 1=Yes 2=No

14. In your own opinion, does the community conservancy help in drought mitigation?
1=Yes 2= No 3= Don't know

Explain

Part 3. Livestock-wildlife interactions.

15. Have you ever incurred any loss due to livestock predation? 1= Yes 2= No
If yes, please estimate the losses in monetary terms (Kshs) for the last one year.....
16. What do you do when you find out that you have lost an animal to a predator?
1= Do nothing, 2= Report to local administration, 3= Report to KWS,
4= Track and kill predator, 5= Set out poison, 6= Set trap(s); kind of trap?
.....
17. Do you practice any form of fencing in your Boma? 1= Yes 2= No
If yes why

18. What other measures should be taken to minimize predation on livestock?

List them.....

19. Does the community conservancy minimize predation on livestock?

1= Yes 2= No 3=Don't Know

Explain.....

Part 4. Wildlife

20. Does the high wildlife biomass and habitat diversity in this area encourage community conservation?

1=Yes 2=No 3=Don't know

Explain..... Do you

have any endangered species within the community sanctuary?

1= Yes 2= No 3= Don't know If Yes, List them

.....Does

their presence attract tourist to the conservancy 1=

Yes 2= No 3= Don't know

Explain..... Do the

tourists coming to these community conservancies help you in anyway?

1=Yes 2= No

If yes, how do they help you?.....

21. How does this influence the success of the community conservancy?

List

Part 5. Diseases

22. How many animals do you have? (Give numbers both at home and elsewhere)

Cattle	Sheep	Goats	Donkeys	Camel

23. Which diseases do you think are transmitted from wildlife to livestock?
..... What number of your livestock die from the above diseases every year:

Cattle	Sheep	Goats	Donkeys	Camel

24. Do you think there are diseases that are transmitted from wildlife and livestock to humans?

List them.....

25. What number of people are affected from above diseases every year:

Children	Adults

26. How do you prevent/control the above diseases?

- a) In Livestock.....
- b) In humans.....

Part 6. Cultural Issues

27. What is your attitude towards game hunting in your area?

Explain.....

28. Has there been a change of attitude in the last ten years towards game meat?

1=Yes 2=No 3=Don't know

29. If yes, Please fill the following table regarding your change of attitude toward game meat in the last ten years. (1 = ate/eat, 2 = did Not eat/do Not eat)

Animal	10 years ago	Present(2008)
Zebra/Loitiko		
Giraffe/Lmeut, Lmara		
Eland/Sirua		
Gazelles/Nkolii		
Impala/Iltarawet		
Ostrich/Sidai		
Water Buck/Nyalagute		
Dik-dik/Rongo		
Others (specify)		

30. What can you say about the following cultural practices related to wildlife hunting?

(1 = fully in Practice, 2 = partially practiced, 3 = No longer practiced)

- a) Warriors hunting lions to show bravery (Ilamaiyo)
- b) Young men killing a lion (s) whenever it kills a cow (s)
- c) Killing of birds to adorn circumcision initiates (Laibartak)

Part 7. General attitudes towards Wildlife

31. Please indicate your feelings regarding wildlife and its conservation in your area as

follows: 1=strongly agree, 2=Agree, 3=undecided, 4= Disagree, 5= strongly disagree

	1	2	3	4	5
In this area wildlife is important to you					
Wildlife conservation is important to society and future generations					
This area should be left open for both livestock and wildlife if there are benefits to the community					
This area should be left open for both livestock and wildlife even without benefits to the community					

Livestock and wildlife should be left to share basic resources like water and pastures					
Development of tourism related activities should be encouraged					
Government policy on revenue sharing with communities is fair					
KWS' conflict minimization methods are adequate					
Wildlife conservation through establishment of community conservancies is a sustainable method for saving wildlife in this area					

32. How can you rate the current status of wildlife numbers in this area in the last ten years? (1=increased, 2=decreased, 3=static)

	Increased	Static	Decreased	Reasons
Lion (Lng'atuny)				
Leopard (Lowarukeri)				
Cheetah (Lnyara)				
Hyena(spotted/Stripped(Lkonoi/Naing'undu)				
Wild dog (Suyian)				
Grevy/zebra (Loibor lkurum/Lkanka)				
Common/zebra (Loitiko)				
Impala (Ltarawet)				
Grants (Nkolii/Ewargas)				
Gerunuk (Rigo)				
Baboons (Lotim)				
Ostrich (Sidai)				
Elephant (Ltome)				
Others (specify)				

33. Is there any poaching taking place in this area? (1 = Yes, 2 = No 3=Don't Know)

If Yes, who do you think is mainly behind the poaching? (1=local residents, 2 =outsiders If No, go to question 47.

34. What species of animals are, according to you, most threatened by poaching? (1 =Lion, 2= Zebra, 3 = Giraffe, 4 = Gazelles, 5 = Greater kudu 6=other (specify)

35. Why do you think the animal species in (42) above is facing the greatest threat?

(1 = disease related, 2 = palatability of its meat, 3 = Its Ivory 4=Skin

5=others (specify).....

Do you think poaching would reduce if all the group ranches in this area either establish community conservancies or benefited in any other way? (1=Yes, 2 =No 3=Don't know)

If Yes, why?.....

If No, why?.....

36. Why else do you think poaching is taking place in this area?.....

37. What should be done to curb poaching in this area? (1 = introduce community scouts, 2 = involve KWS Rangers more, 3 = establish community conservancies 4= other – specify).....

38. What do you think would be most important incentives for successful community wildlife Conservation in this area?

1=Revenue sharing; 2= Compensation for losses; 3= increased security for wildlife,

4=others-specify

Part 8. Security issues

39. Do you experience insecurity problems due to banditry and cattle rustling in this area?

1=Yes 2=No

40. Since the setting up of the community conservancy, has the insecurity problem;

1=increased 2= remained the same 3=decreased

Reasons.....

Appendix 7.2: Name of Household heads and GPS Mapping

Name of Conservancy	Household Name	GPS Location
Naibung'a	Lekorere	255859E 0039158N
	Ole Kasoo	25587E 0039152N
	Ole Ntaiya	267082E 0061292N
	Ole Kilesi	267102E 0061300N
	Lekiding	267105E 0061302N
	Ole Kimiri	267105E 00613308N
	Ole Kipanoi	267106E 0061306N
	Ole Kirobi	267115E
	Ole Kiteru	267122E 0061330N
	Lelarpei	267139E 0061338
	Ledokoyo	267140E 0061338N
	Ole Legei	267159E 0061337N
	Lekilit	267162E 0061336N
	Lekopien	267204E 0061193N
	Lekulal	273715E 0056683N
	Lekuton	273721E 0056699N
	Lelekung	273727E 0056700N
	Lemiliko	273733E 0056700N
	Lemoge	273735E 0056716N
	Lemonto	278153E 005227N
	Lemosiany	278953E 0052272N
	Lempaira	278953E 0052272
	Lenaiputari	278953E 0052272N
	Leng'ingiro	278954E 0052272N
	Lenges	279781E 0053860N
	Lengila	279787E 0053869N
	Lengima	279956E 0053755N 05
	Lengingiro	279957E 0053754N
	Lengongolian	279960 0053750N
	Lenkirikai	280087E 005308N
	Lenkisuya	280108E 0053922N
	Lentunyo	280710E 0053918N
	Lesipe	28581E 0039153N
	Ole Soipa	285832E
	Ole Mamai	285832E 003178N
	Ole Mamaiyo	285832E 0039178N
	Ole Manyas	285848E 0039151N
	Ole Melita	285851E 0039153N
	Ole Meshami	285851E 0039158
	Ole Metiaki	285851E 0039164N
Ole Mosiany	285859E 0039169N	
Ole Meshami	285876E 0039200N	

	Ole Ruso	286077E 0039490N
	Ole Naimado	255859E 0039158N
	Ole Mosiany	25587E 0039152N
	Ole Rana	267082E 0061292N
	Ole Rana	267102E 0061300N
	Ole Piroris	267105E 0061302N
	Ole Putonoi	267105E 00613308N
	Ole Rana	267106E 0061306N
	Ole Ruma	267115E
	Ole Santa	267122E 0061330N
	Olesarioyo	267139E 0061338
	Ole Senei	267140E 0061338N
	Ole Senjura	267159E 0061337N
	Ole Setek	267162E 0061336N
	Ole Sitiamotoi	267204E 0061193N
	Ole Wanto	273715E 0056683N
<i>Namunyak</i>	Lekaroiya	314144E 0109128N
	Ledamako	314352E 0108981N
	Learao	314361E 0108986N
	Ledornko	3144808E 0107406N
	Lekarao	314568E 0107519N
	Lekilelei	314570E 0107491N
	Lekitwai	314570E 0107522N
	Lekotai	314573E 0107519N
	Lekupaye	314576E 0107513N
	Lekutai	314775E 0107457N
	Lekuton	315199E 01073534N
	Lekwale	315329E 0107824N
	Lemasiene	315330E 0107447N
	Lembwakita	315359E 0107401N
	Lenaitwida	315376E 0107227N
	Lenamwale	315379E 0107500N
	Lenantampash	315392E 0107568N
	Lenaipa	315402E 0107484N
	Lendunda	315408E 0107863N
	Lesil	3144808E 0107406N
	Lepuyapi	315446E 0107708N
	Leremito	315481E 0107699N
	Lesantang'oi	315487E 0107724N
	Leseela	315514E 0107908
	Lesilele	315620E 010727267N
	Lesowapir	315667E 0107270N
	Lesukut	314144E 0109128N
	Lekirding	314352E 0108981N
	Lekonyek	314361E 0108986N

Appendix 7.3: ANOVA and Regression Statistic Tables

Regression- Success of community conservancies

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.812(a)	.660	.650	.57057622	.660	68.474	3	106	.000

a Predictors: (Constant), General change in attitude towards wildlife, Have you benefited form revenue sharing, Have you heard about revenue sharing around the community conservancies

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	66.877	3	22.292	68.474	.000(a)
	Residual	34.509	106	.326		
	Total	101.386	109			

a Predictors: (Constant), General change in attitude towards wildlife, Have you benefited form revenue sharing, Have you heard about revenue sharing around the community conservancies

b Dependent Variable: Success of community conservancies

Interpretation:

The model is statistically significant ($p < 0.05$). The R-squared is 0.66, meaning that approximately 66% of the variability of success of CBC is accounted for by the variables in the model. In this case, the adjusted R-squared indicates that about 65% of the variability of success of CBC is accounted for by the model, even after taking into account the number of predictor variables in the model. The coefficients for each of the variables indicates the amount of change one could expect in success of CBC given a one-unit change in the value of that variable, given that all other variables in the model are held constant. For example, consider the variable general change in attitudes towards wildlife. We would expect an

increase of 1.101 in the success of CBC score for every one unit increase in revenue sharing, assuming that all other variables in the model are held constant.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-2.604	.223		11.693	.000	-3.045	-2.162
	Have you heard about revenue sharing around the community conservancies	.809	.169	.312	4.776	.000	.473	1.145
	Have you benefited from revenue sharing	1.101	.119	.566	9.240	.000	.865	1.338
	General change in attitude towards wildlife	.174	.060	.178	2.905	.004	.055	.293

a Dependent Variable: Success of community conservancies

Regression-Acceptance of wildlife

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.813(a)	.661	.658	.51052840	.661	210.448	1	108	.000

a Predictors: (Constant), Does their presence attract tourist to the conservancy

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.851	1	54.851	210.448	.000(a)
	Residual	28.149	108	.261		
	Total	83.000	109			

a Predictors: (Constant), Does their presence attract tourist to the conservancy

b Dependent Variable: Acceptance of wildlife

Interpretation:

The model is statistically significant ($p < 0.05$). The R-squared is 0.661, meaning that approximately 66.1% of the variability of success of CBC is accounted for by the variables in the model. In this case, the adjusted R-squared indicates that about 65.8% of the variability of acceptance of wildlife as an alternative land use is accounted for by the model, even after taking into account the number of predictor variables in the model. The success of CBC score for every one unit increase in general change in attitudes towards wildlife, assuming that all other variables in the model are held constant.

We would expect an increase of 0.174 in the acceptance of wildlife as an alternative land use score for every one unit increase in general change in attitudes towards wildlife, assuming that all other variables in the model are held constant.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-1.671	.125		13.362	.000	-1.918	-1.423
	Does their presence attract tourist to the conservancy	1.377	.095	.813	14.507	.000	1.189	1.565

a. Dependent Variable: Acceptance of wildlife